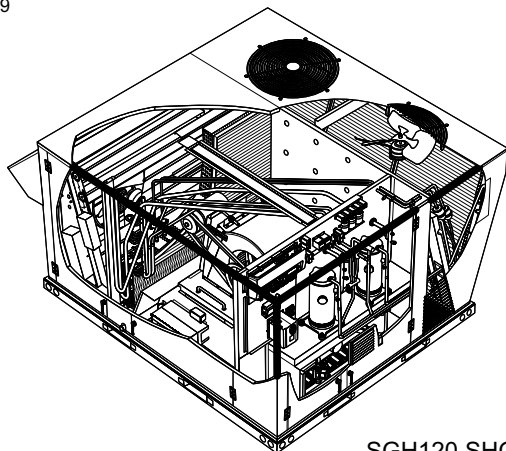




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SGH120 SHOWN

INSTALLATION INSTRUCTIONS

- SGH/SCH036 (3 TON)**
- SGH/SCH060 (5 TON)**
- SGH/SCH120 (10 TON)**
- SGH/SCH240 (20 TON)**

ROOFTOP UNITS

507964-01

9/2019

Supersedes 507364-02

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⚠ IMPORTANT

Supply air VFD motor rotation is controlled independently from scroll compressor rotation. See Cooling Start-Up section for correct compressor rotation. Compressor damage due to improper rotation is the responsibility of the installer.

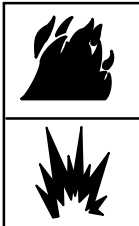
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RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier



⚠ WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

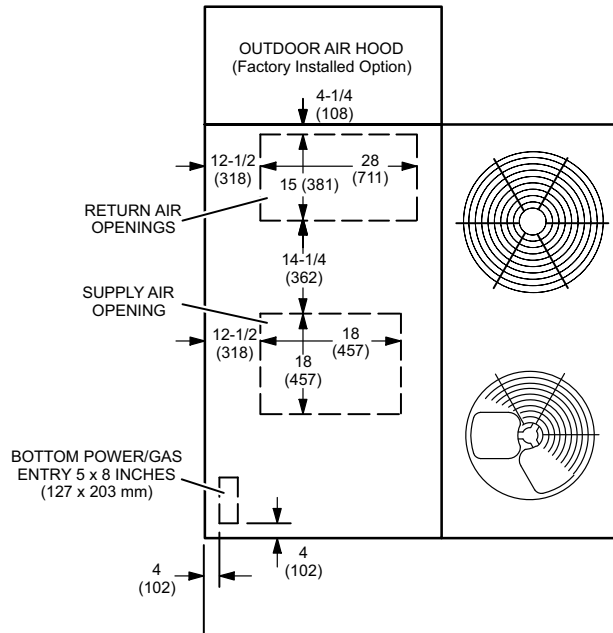


Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

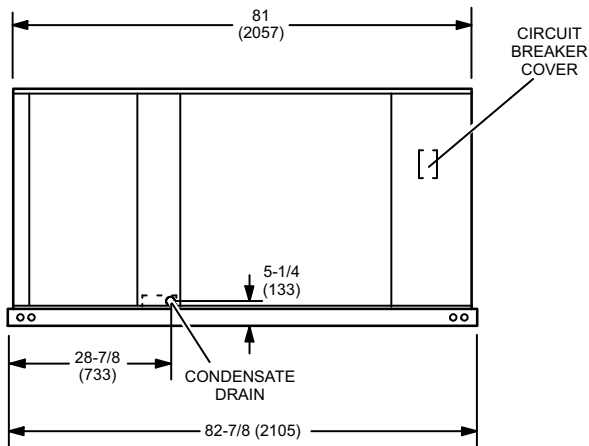
Installation and service must be performed by a qualified installer, service agency or the gas supplier.

WHAT TO DO IF YOU SMELL GAS:

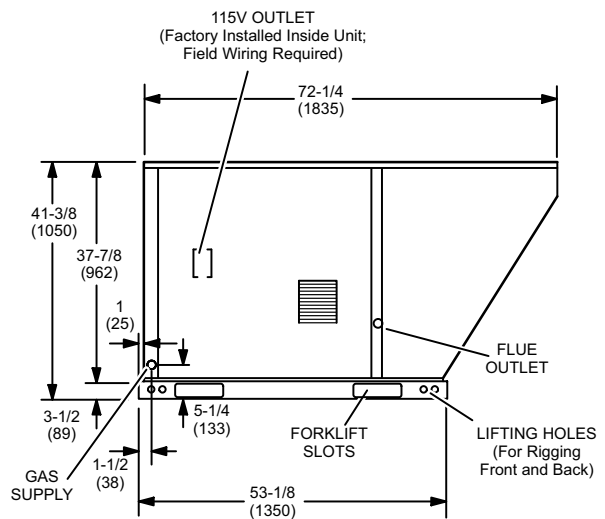
- Do not try to light any appliance.
- Extinguish any open flame.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.



TOP VIEW

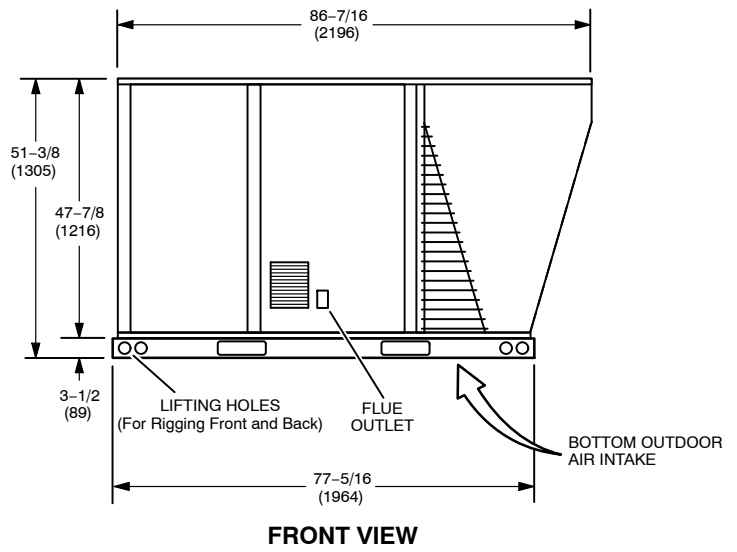
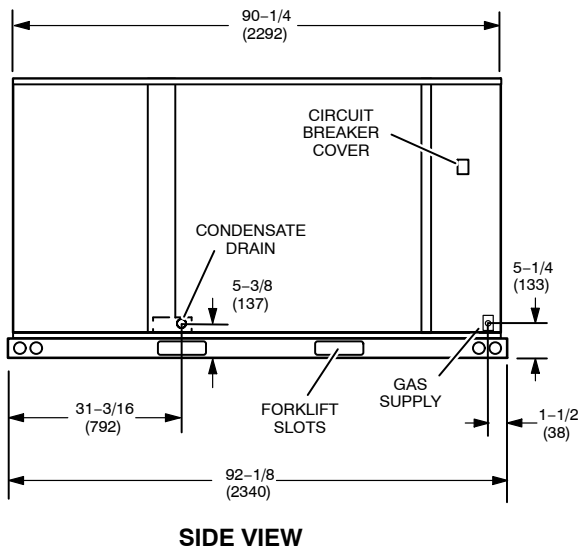
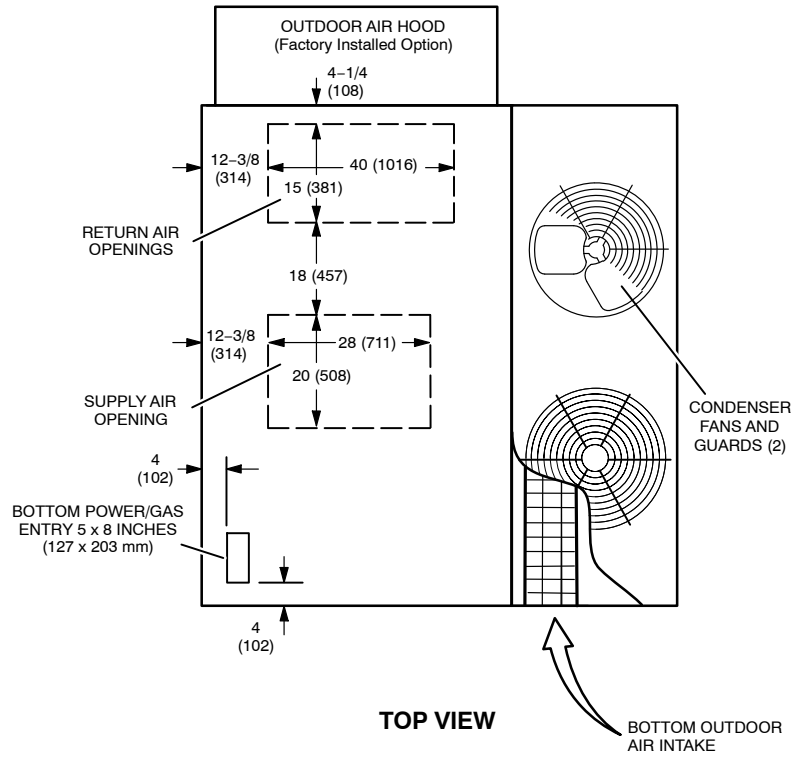


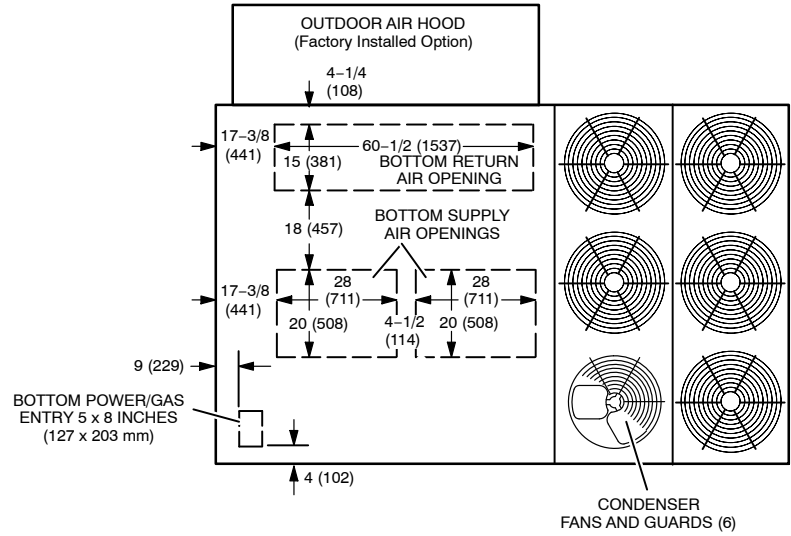
SIDE VIEW



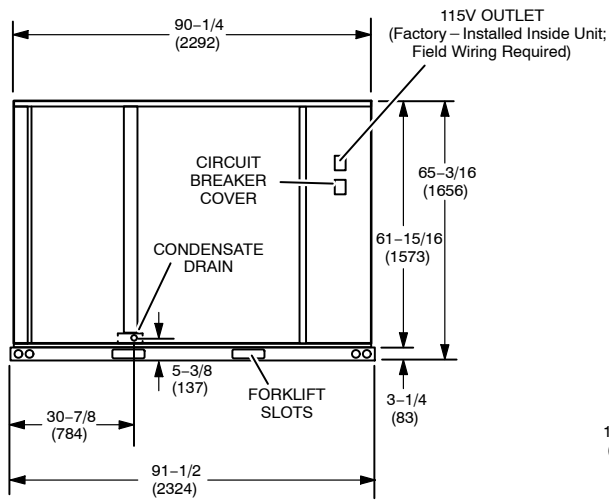
FRONT VIEW

SG / SC 120 Dimensions - SG Heat Section Shown

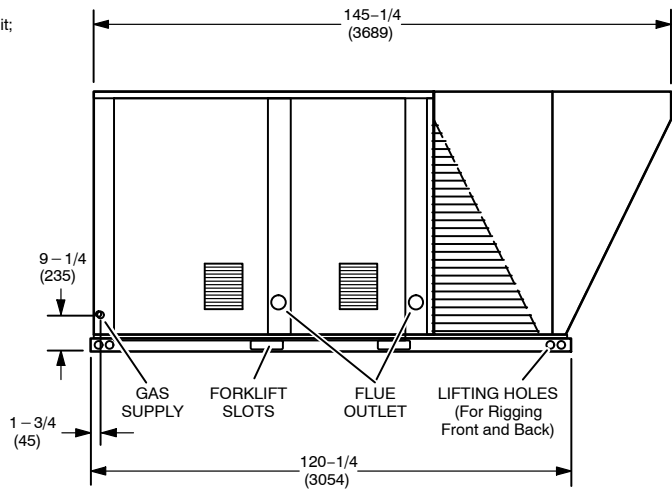




TOP VIEW

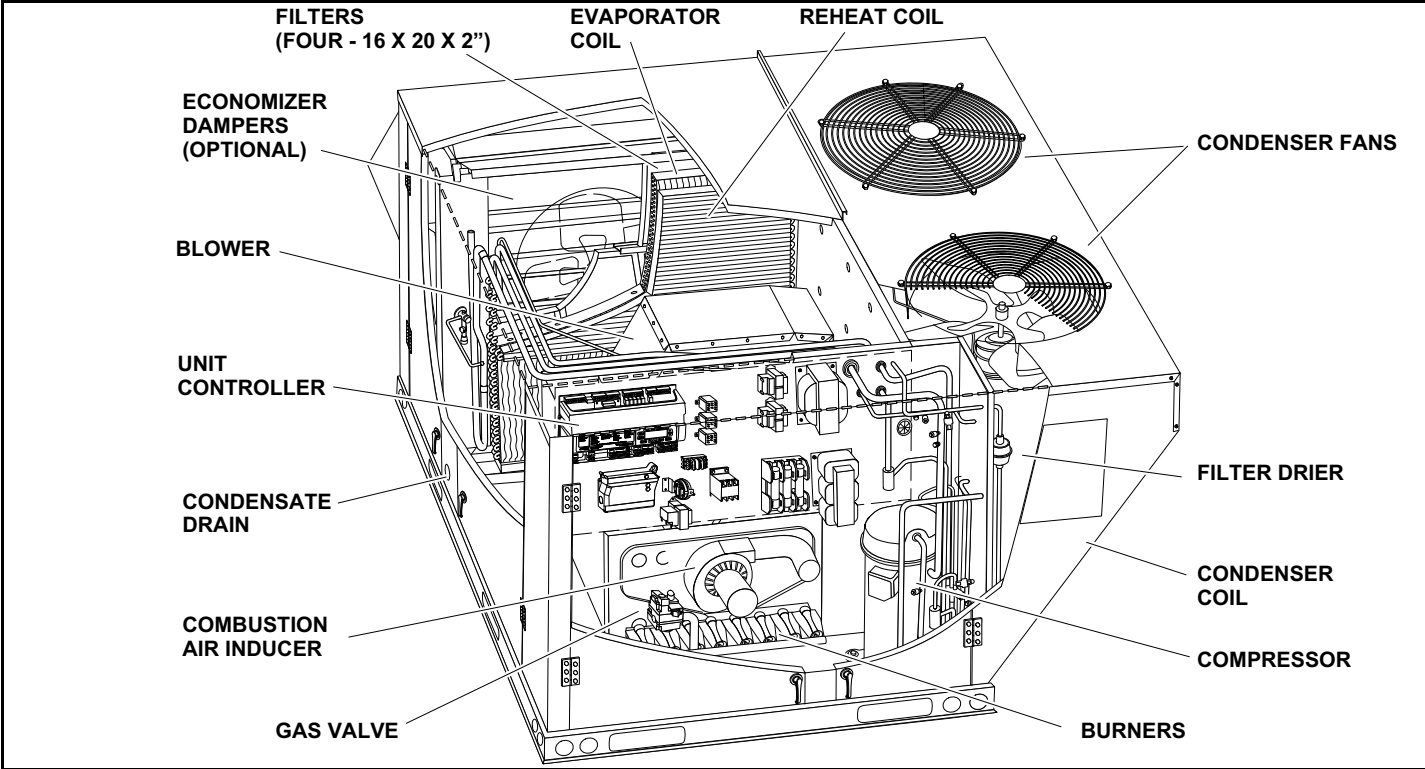


SIDE VIEW

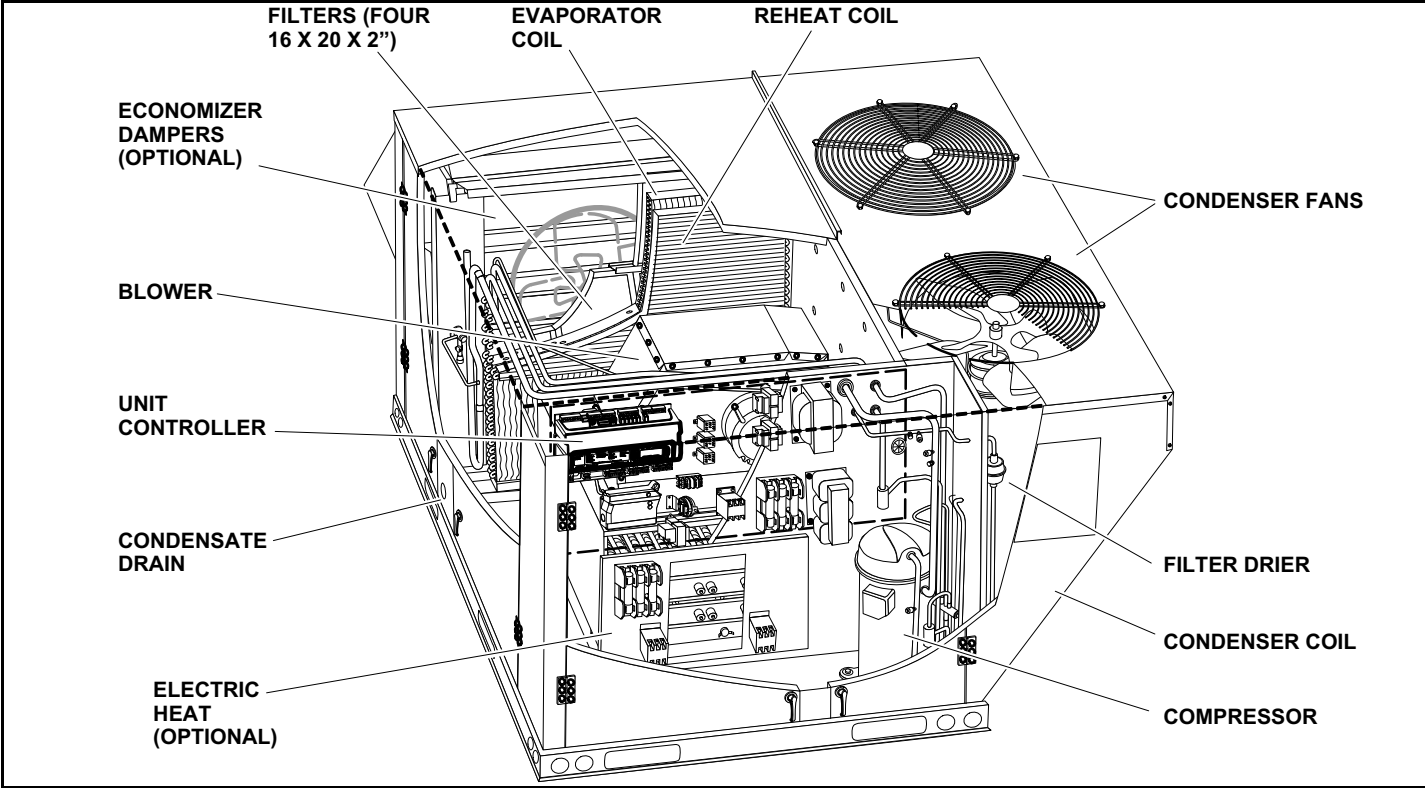


FRONT VIEW

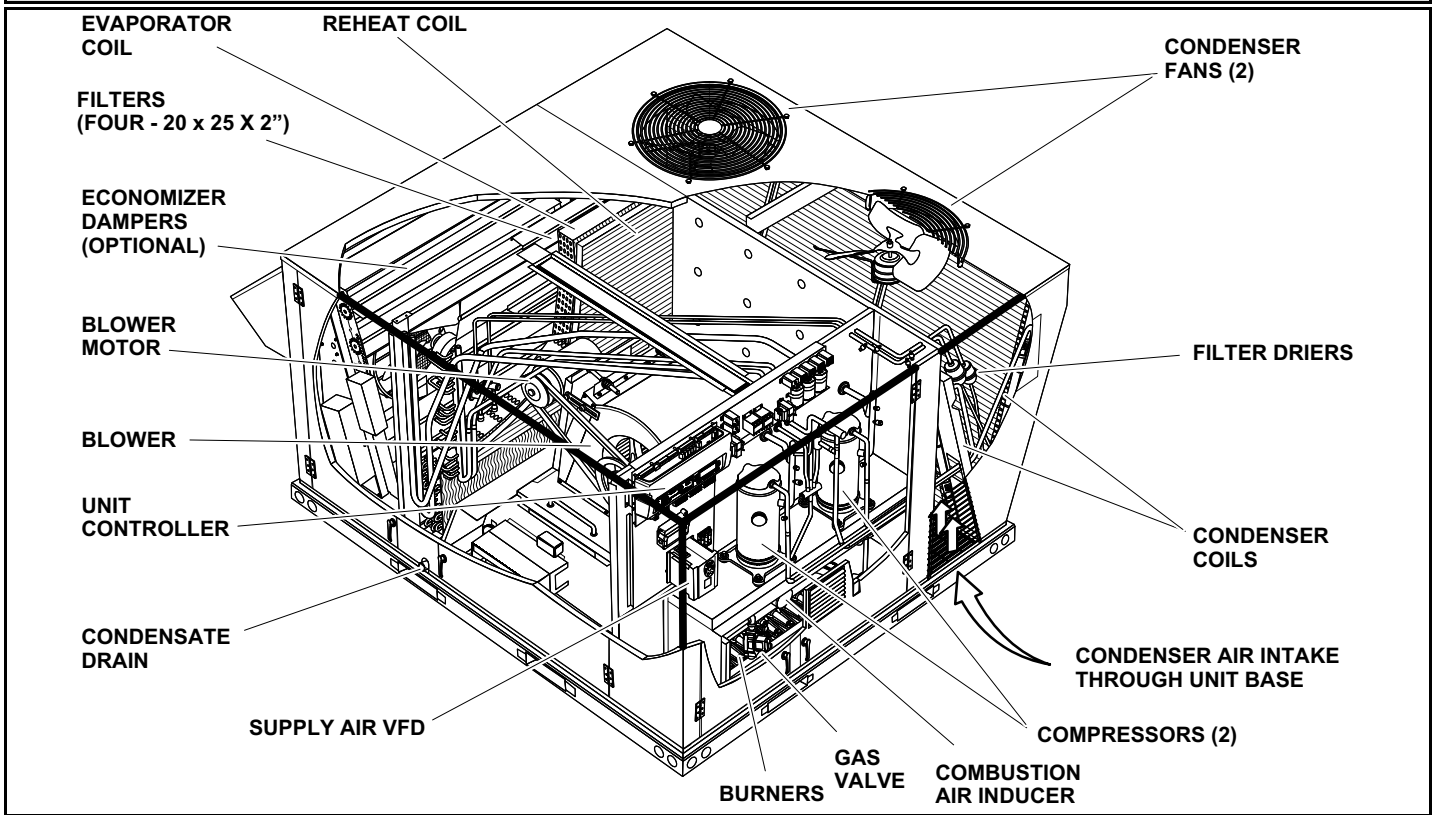
SG 036 & 060 Parts Arrangement



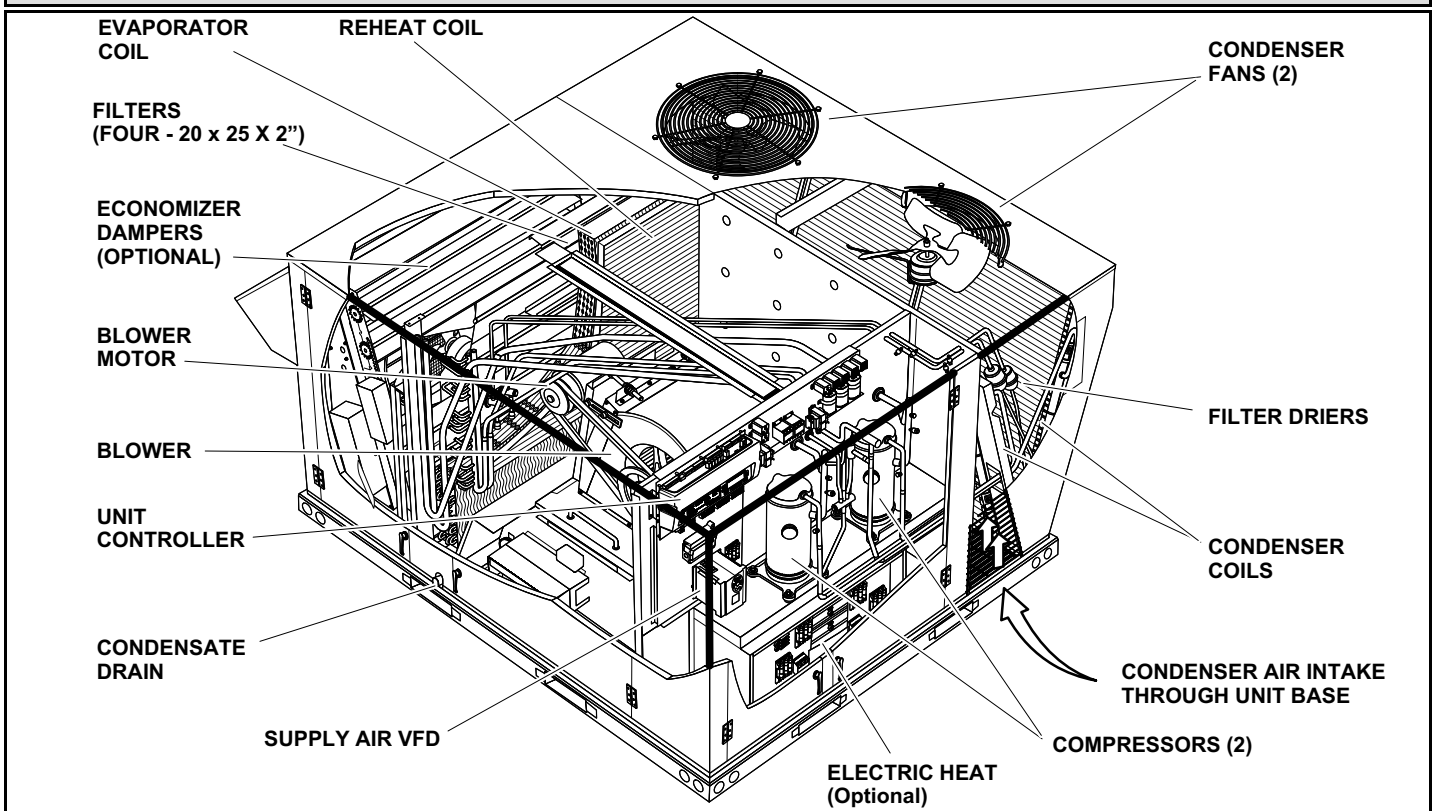
SC 036 & 060 Parts Arrangement



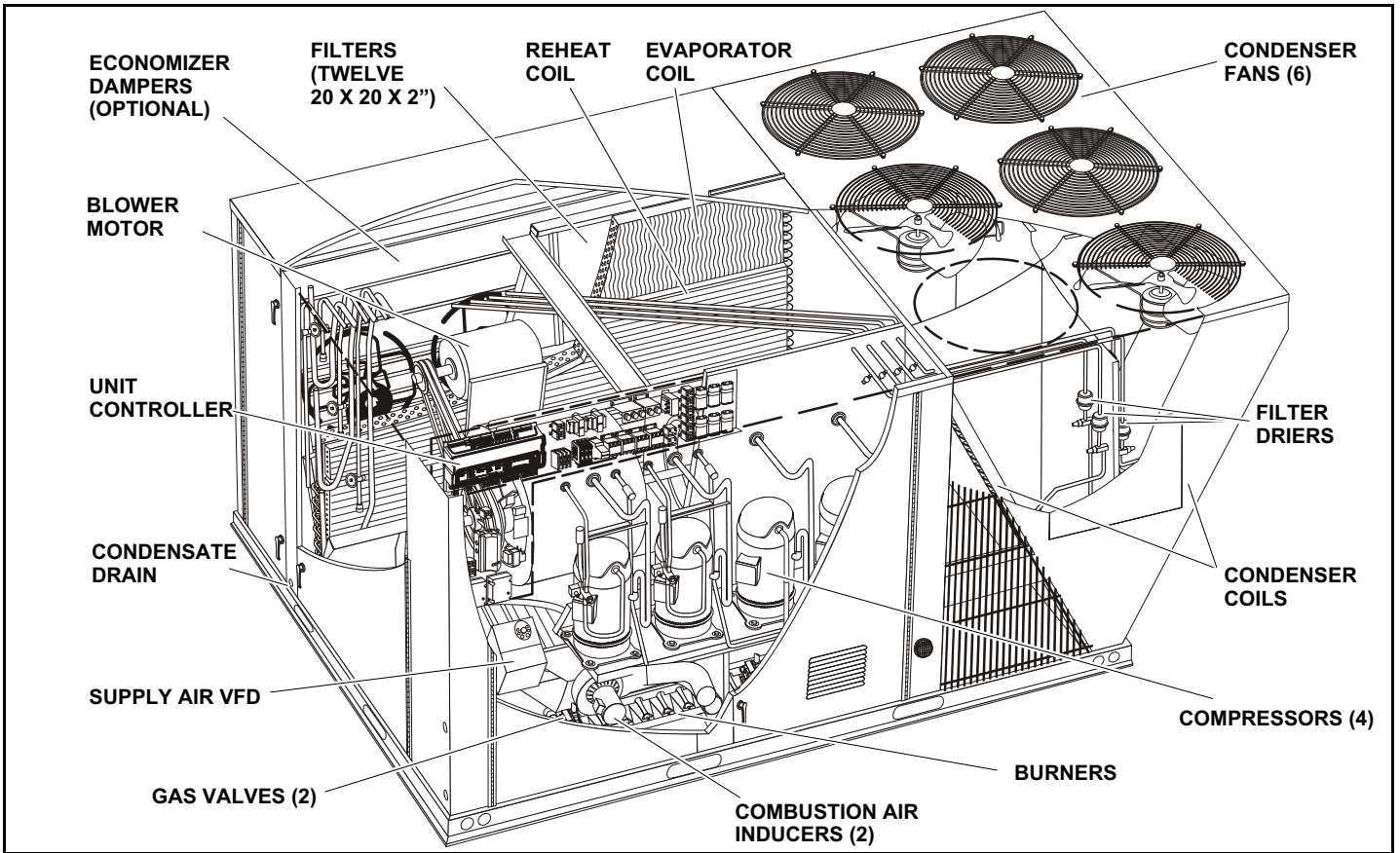
SG 120 Parts Arrangement



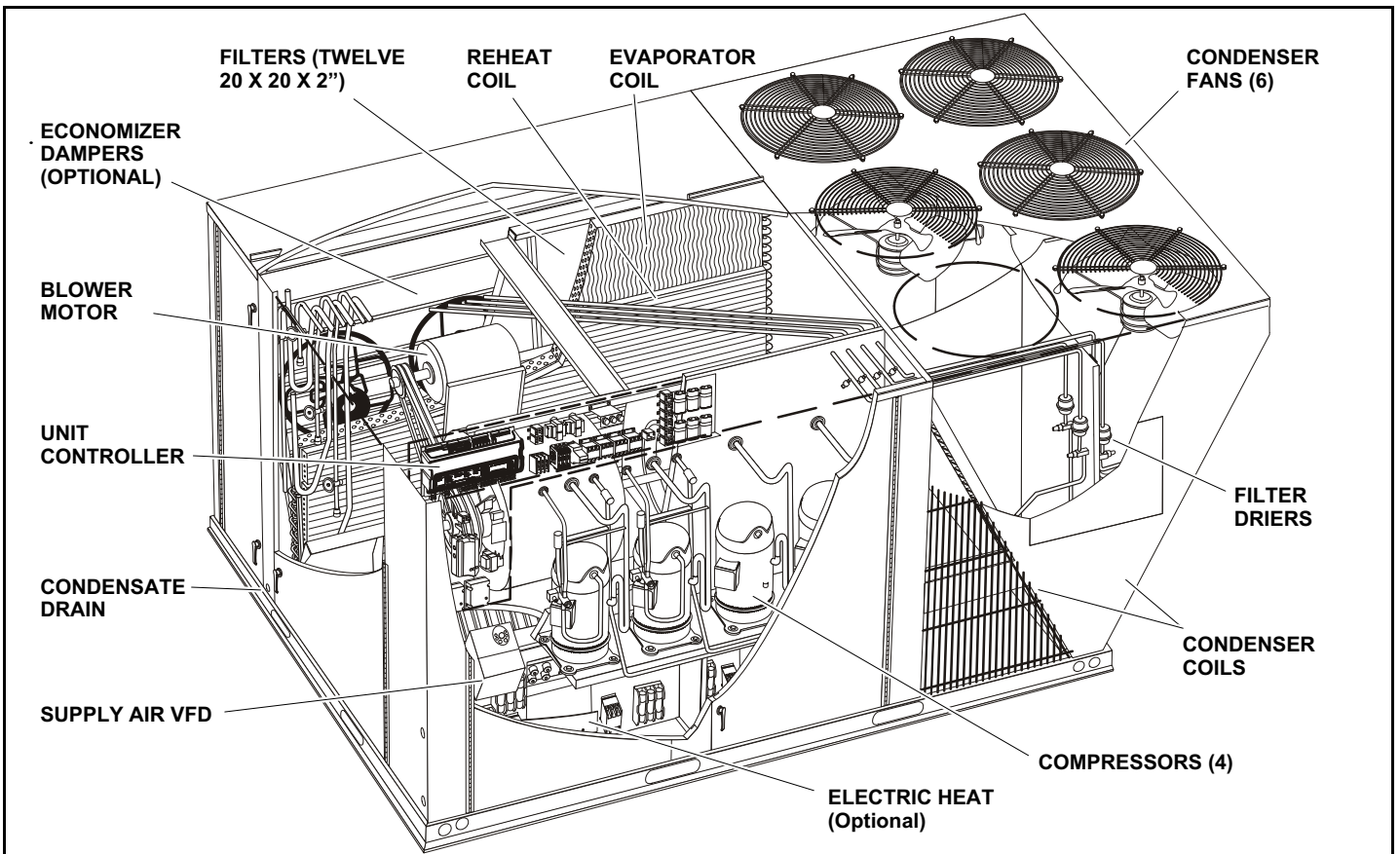
SC 120 Parts Arrangement



SG 240 Parts Arrangement



SC 240 Parts Arrangement



Shipping and Packing List

Package 1 of 1 contains:

1- Assembled unit

Check unit for shipping damage. Receiving party should contact last carrier immediately if shipping damage is found.

⚠ CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

General

These instructions are intended as a general guide and do not supersede local codes in any way. Authorities having jurisdiction should be consulted before installation.

The SG 036 gas/electric packaged rooftop unit is available in 70,000 and 108,000 Btuh heating input. The SC 036 cooling packaged rooftop unit is the same basic design as the SG 036 unit except for the heating section. Optional electric heat is factory-installed in SC units. SG and SC 036 units have identical refrigerant circuits with 3-ton cooling capacities.

The SG 060 gas/electric packaged rooftop unit is available in 70,000, 108,000, and 150,000 Btuh heating input. The SC 060 cooling packaged rooftop unit is the same basic design as the SG 060 unit except for the heating section. Optional electric heat is factory-installed in SC units. SG and SC 060 units have identical refrigerant circuits with 5-ton cooling capacities.

The SG 120 gas/electric packaged rooftop unit is available in 130,000, 180,000, or 240,000 Btuh heating inputs. The SC 120 cooling packaged rooftop unit is the same basic design as the SG 120 unit except for the heating section. Optional electric heat is factory-installed in SC units. SG and SC 120 units have identical refrigerant circuits with a total of 10-ton cooling capacities.

The SG 240 gas/electric packaged rooftop unit is available in (260,000, 360,000, or 480,000 Btuh heating inputs). The SC 240 cooling packaged rooftop unit is the same basic design as the SG 240 unit except for the heating section. Optional electric heat is factory-installed in SC units. SG and SC 240 units have identical refrigerant circuits with 20-ton cooling capacities.

Units are equipped with multi-stage air volume (MSAV™) supply air blowers.

Units use R410A, an ozone-friendly HFC refrigerant. Refer to the Cooling Start-Up section (Page 29) for precautions when installing unit.

Safety

⚠ WARNING



Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

See figure 1 for unit clearances.

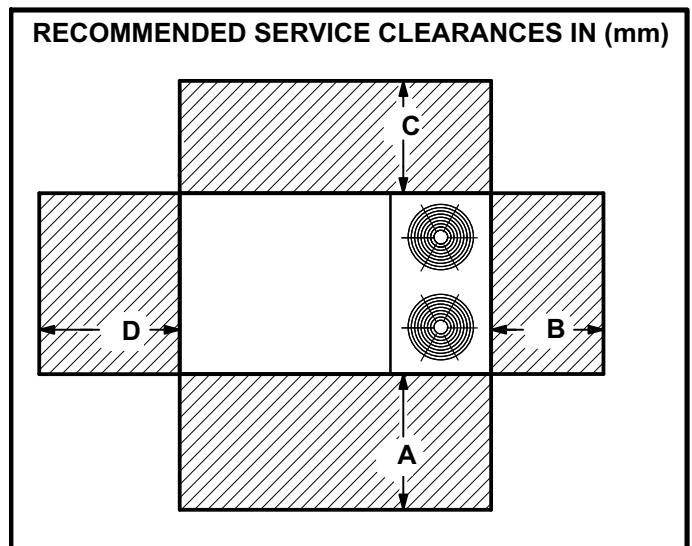


FIGURE 1

1 Unit Clearance		A		B		C		D		Top Clearance
		in.	mm	in.	mm	in.	mm	in.	mm	
Service Clearance	SG/SC 036, 060	72	1829	36	914	60	1524	60	1524	Unobstructed
Service Clearance	SG/SC 120	72	1829	36	914	60	1524	72	1829	
Service Clearance	SG/SC 240	72	1829	36	914	60	1524	96	2438	
Clearance to Combustibles	All	36	914	1	25	1	25	1	25	
Minimum Operation Clearance	All	36	914	36	914	36	914	36	914	

NOTE - Entire perimeter of unit base requires support when elevated above the mounting surface. 1-Service Clearance - Required for removal of serviceable parts. Clearance to Combustibles - Required clearance to combustible material. Minimum Operation Clearance - Required clearance for proper unit operation.

⚠ NOTICE

Roof Damage!

This system contains both refrigerant and oil. Some rubber roofing material may absorb oil, causing the rubber to swell. Bubbles in the rubber roofing material can cause leaks. Protect the roof surface to avoid exposure to refrigerant and oil during service and installation. Failure to follow this notice could result in damage to roof surface.

Use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

If this unit has been used for heating or cooling of buildings or structures under construction, the following conditions must be met or the warranty will be void:

- The vent hood must be installed per these installation instructions.
- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating or cooling is not allowed.
- A pre-filter must be installed at the entry to the return air duct.
- The return air duct must be provided and sealed to the unit.
- Return air temperature range between 55°F (13°C) and 80°F (27°C) must be maintained.
- Air filters must be replaced and pre-filters must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The unit operating conditions (including airflow, cooling operation, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

NOTE - The Commonwealth of Massachusetts stipulates these additional requirements:

- Gas units shall be installed by a licensed plumber or gas fitter only.
- The gas cock must be "T handle" type.

Unit Support - Downflow Discharge Applications

Installer's Roof Mounting Frame

Many types of roof frames can be used to install the unit depending upon different roof structures. Items to keep in mind when using the building frame or supports are:

- 1- The base is fully enclosed and insulated, so an enclosed frame is not required.
- 2- The frames or supports must be constructed with non-combustible materials and should be square and level to 1/16" per linear foot (5mm per linear meter) in any direction.

Exception:

1/16" per linear foot to 3/8" per linear foot roof pitch (5mm per linear meter to 20mm per linear meter)—

Roof curb can be installed level to the roof pitch only if the unit outdoor air intake is oriented toward the higher side of the roof pitch.

- 3- Frame or supports must be high enough to prevent any form of moisture from entering unit. Recommended minimum frame height is 14" (356mm).
- 4- Duct must be attached to the roof mounting frame and not to the unit. Supply and return plenums must be installed before setting the unit.
- 5- Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

NOTE-When installing a unit on a combustible surface for downflow discharge applications, a Lennox roof mounting frame is required.

NOTE - Securely fasten roof frame to roof per local codes.

⚠ CAUTION

To reduce the likelihood of supply / return air bypass and promote a proper seal with the RTU, duct work / duct drops / diffuser assemblies must be supported independently to the building structure.

- 6- 120 units will overhang the roof mounting frame as shown in figure 2.

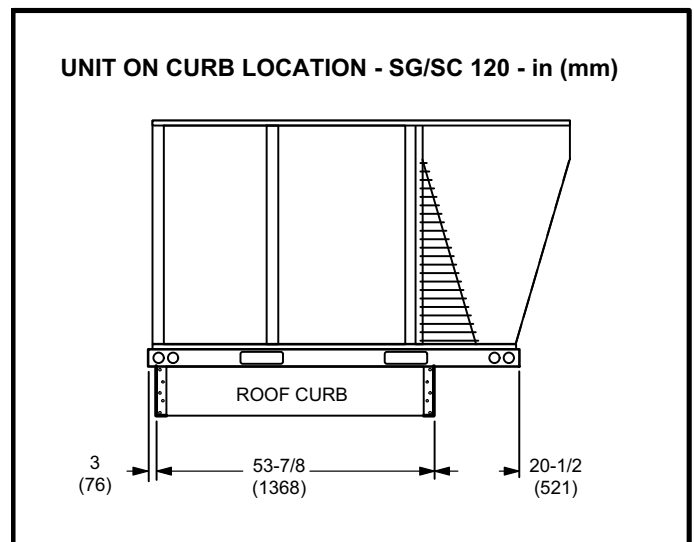


FIGURE 2

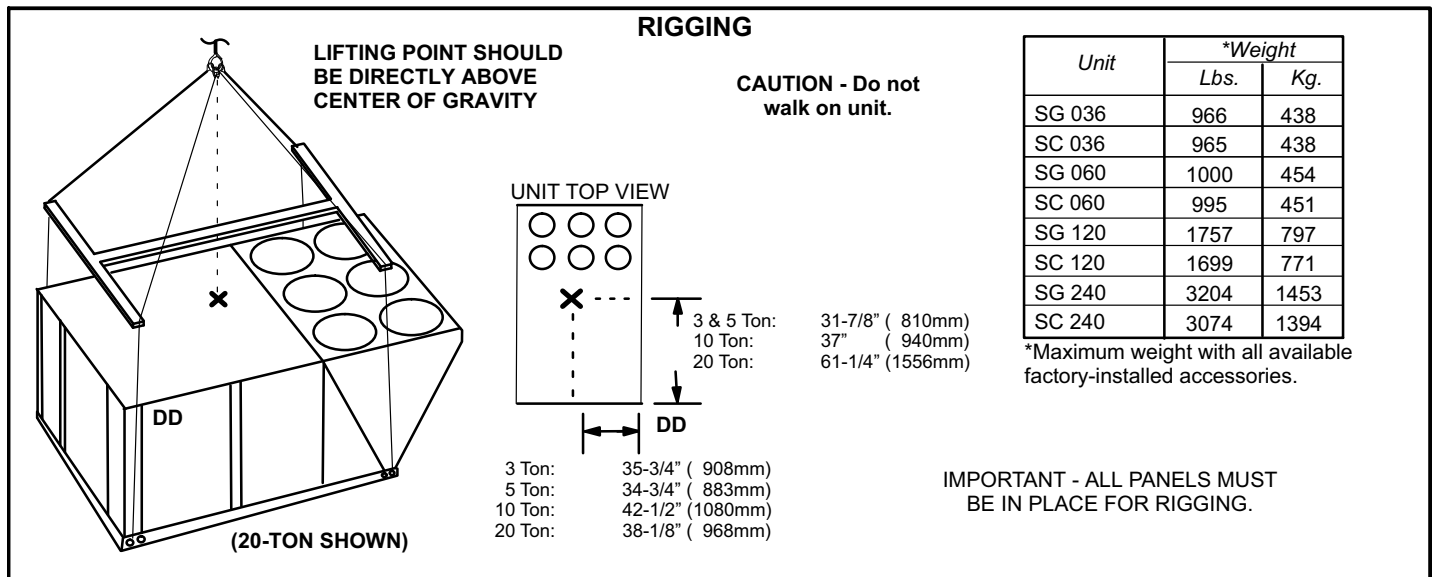


FIGURE 3

Duct Connections

All exterior ducts, joints, openings in roof or building walls must be insulated and weather-proofed with flashing and sealing compounds in accordance with applicable codes. Any duct passing through an unconditioned space must be insulated.

⚠ CAUTION

In downflow applications, do not drill or punch holes in base of unit. Leaking in roof may occur if unit base is punctured.

Rigging Units For Lifting

Rig unit for lifting by attaching four cables to holes in unit base rail. See figure 3.

- 1- Detach wooden base protection before rigging.
- 2- Connect rigging to the unit base using both holes in each corner.
- 3- All panels must be in place for rigging.
- 4- Place field-provided H-style pick in place just above top edge of unit. Frame must be of adequate strength and length. (H-style pick prevents damage to unit.)
- 5- Lifting point should be directly above center of gravity. See figure 3 for center of gravity dimensions. Corner "DD" is on the left corner when facing compressors and heat section.

Condensate Drains

Make drain connection to the 1" N.P.T. drain coupling provided on unit. A trap must be installed between drain connection and an open vent for proper condensate removal. See figure 4. It is sometimes acceptable to drain condensate onto the roof or grade; however, a tee should be fitted to the trap to direct condensate downward. The condensate line must be vented. Check local codes concerning condensate disposal. Refer to pages 1, 2 and 3 for condensate drain location.

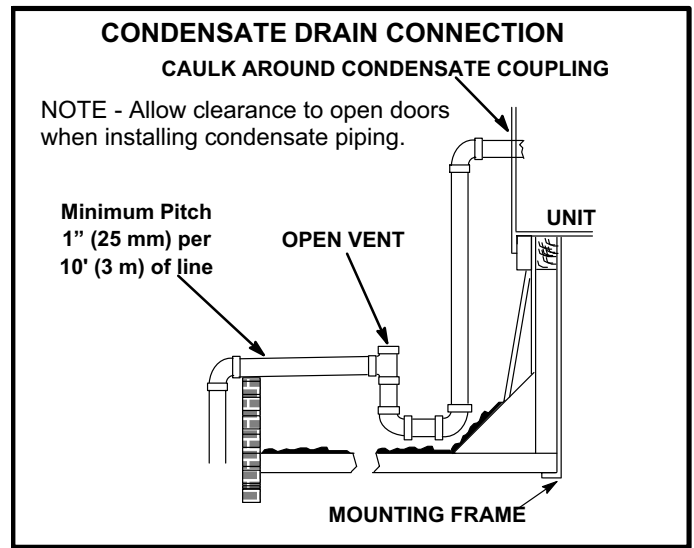


FIGURE 4

Connect Gas Piping - SG Units

NOTE - Remove the cardboard shipping brace from the flexible gas line in the power entry area before operating the unit.

Before connecting piping, check with gas company or authorities having jurisdiction for local code requirements. When installing gas supply piping, length of run from gas meter must be considered in determining pipe size for 0.5" w.c. (.12kPa) maximum pressure drop. Do not use supply pipe smaller than unit gas connection. For natural gas units, operating pressure at the unit gas connection must be a minimum of 4.5" w.c. (1.12kPa) and a maximum of 10.5" (2.60kPa) w.c. For LP/propane gas units, operating pressure at the unit gas connection must be a minimum of 11" w.c. (2.74kPa) and a maximum of 13.0" w.c. (3.23kPa).

When making piping connections a drip leg should be installed on vertical pipe runs to serve as a trap for sediment or condensate. A 1/8" N.P.T. plugged tap is located on gas valve for test gauge connection. See figure 30 for tap location. Install a ground joint union between the gas control manifold and the main manual shut-off valve. See figure 5 or 6 for gas supply piping entering outside the unit. See figure 7 for gas supply piping entering bottom the unit.

Compounds used on threaded joints of gas piping shall be resistant to the action of liquified petroleum gases.

Pressure Test Gas Piping - SG Units

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See figure 8.

NOTE - Codes may require that manual main shut-off valve and union (furnished by installer) be installed in gas line external to unit. Union must be of the ground joint type.

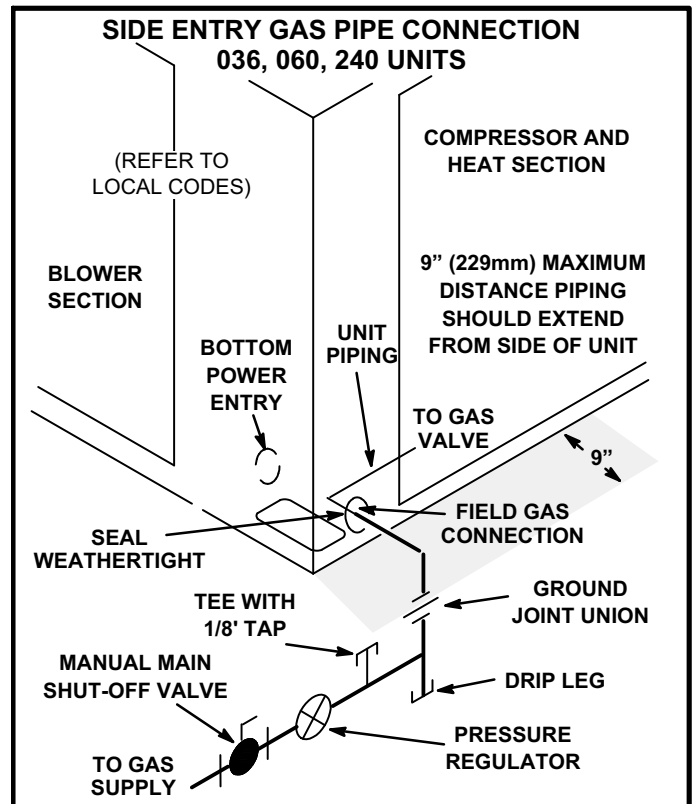


FIGURE 5

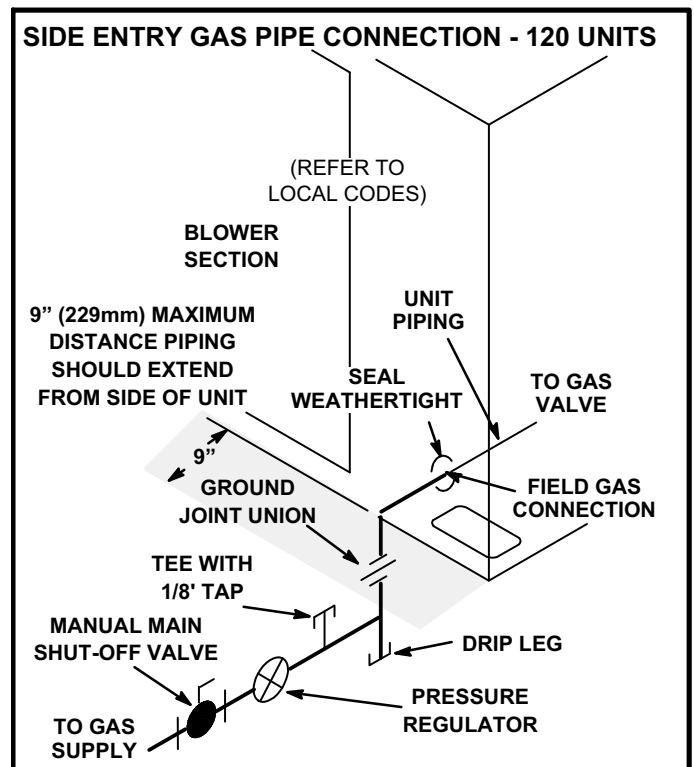


FIGURE 6

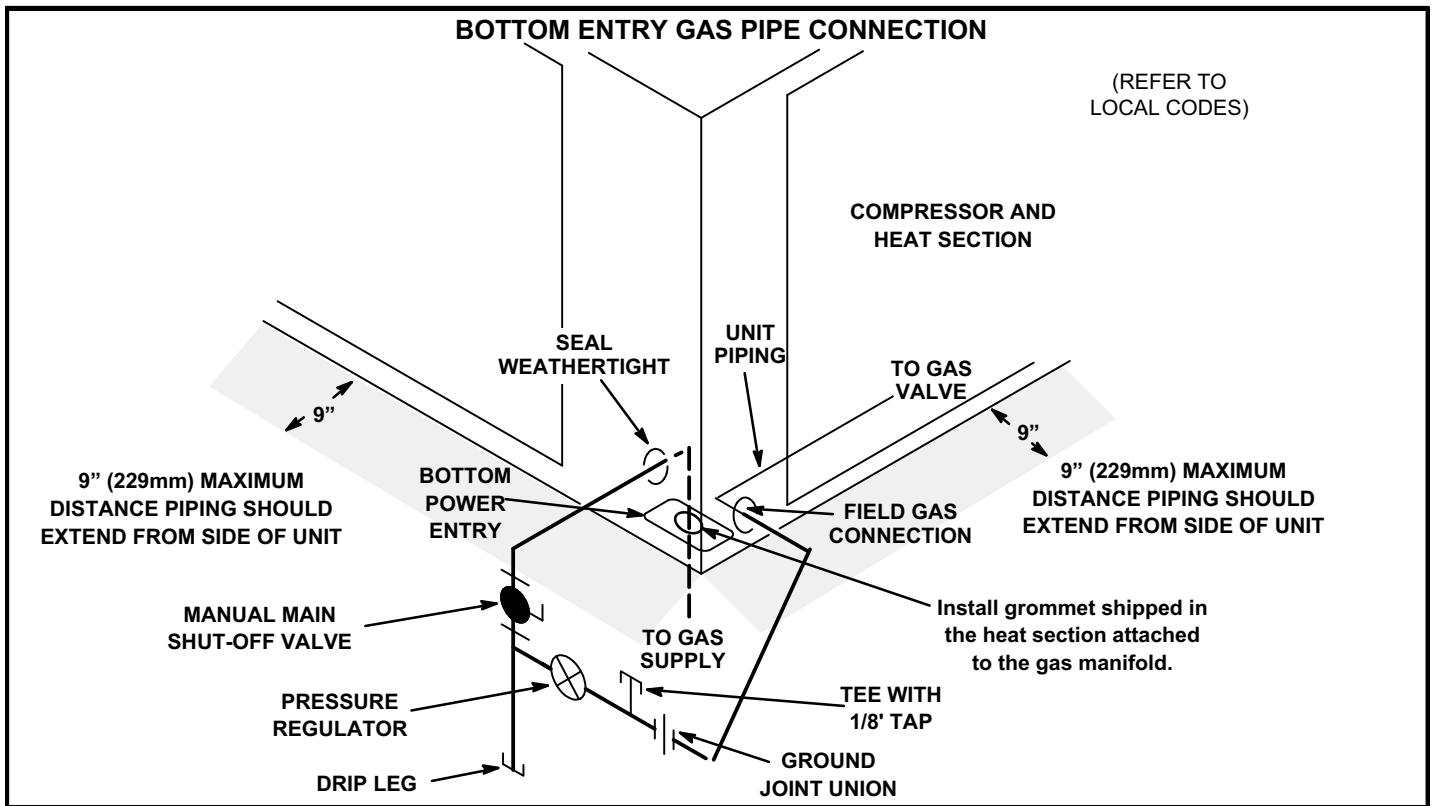


FIGURE 7

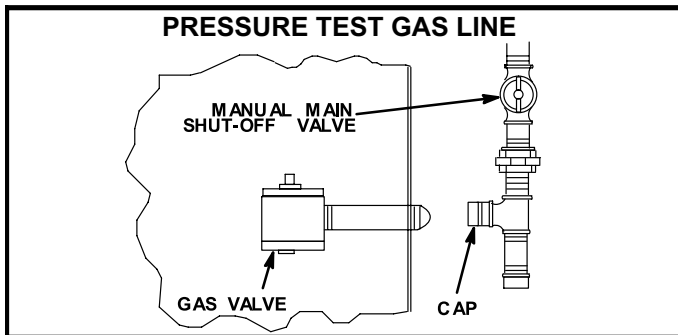


FIGURE 8

After all connections have been made, check all piping connections for gas leaks. Also check existing gas connections up to the gas valve; loosening may occur during installation. Use a soap solution or other preferred means. Do not use matches candles or other sources of ignition to check for gas leaks.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

NOTE - In case emergency shut down is required, turn off the main manual shut-off valve and disconnect main power to unit. These devices should be properly labeled by the installer.

High Altitude Derate

Locate the high altitude conversion sticker in the unit literature bag. Fill out the conversion sticker and affix next to the unit nameplate.

Refer to table 1 for high altitude adjustments.

**TABLE 1
HIGH ALTITUDE DERATE**

Altitude Ft.*	Gas Manifold Pressure
2000-4500	See Unit Nameplate
4500 And Above	Derate 2% / 1000 Ft. Above Sea Level

*Units installed at 0-2000 feet do not need to be modified.

NOTE - This is the only permissible derate for these units.

Optional Outdoor Air Hood

036 & 060 Units

Intake hood is shipped folded down over the horizontal supply air opening. Secure hood into place as follows:

- 1- Remove shipping screws securing sides of hood to unit.
- 2- Pivot hood as shown in figure 9 and secure sides of hood to unit mullions with two sheet metal screws on each side.

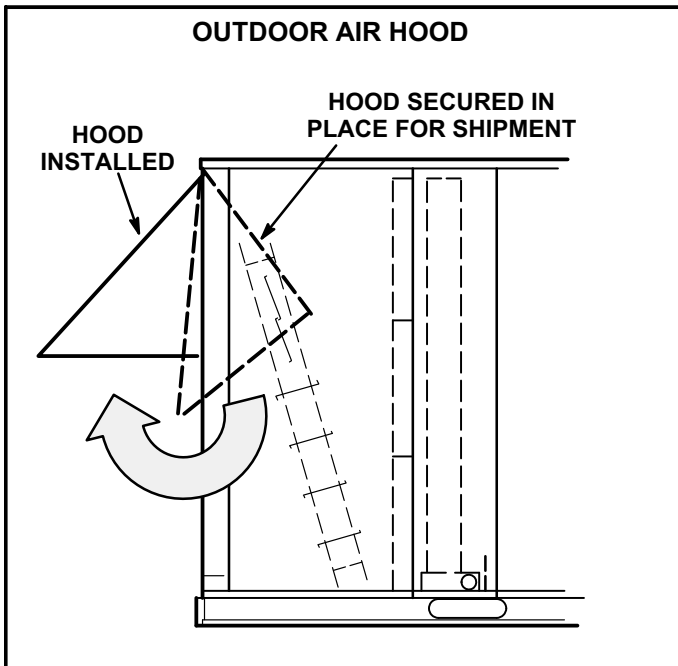


FIGURE 9

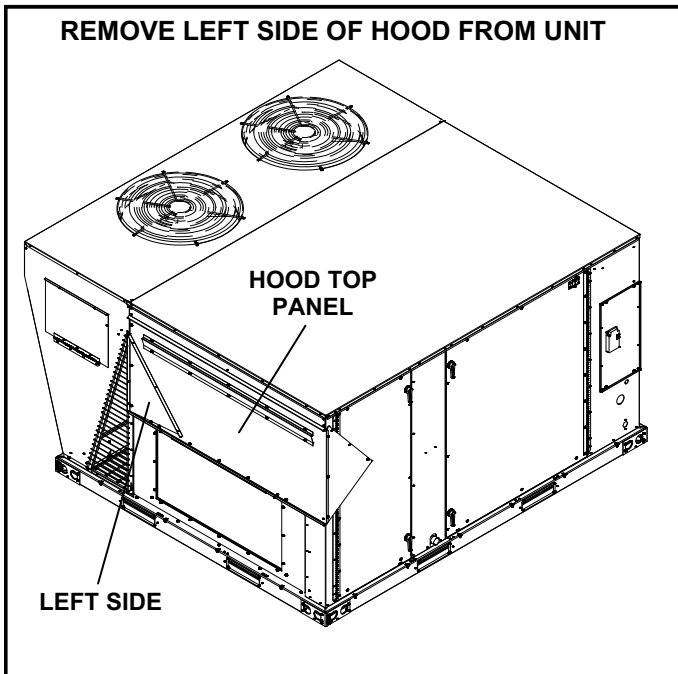


FIGURE 10

120, 240 Units With Bird Screen Option

Outdoor air hood is shipped folded down over the horizontal supply air opening. Install hood as follows:

- 1- Remove left side from hood top panel. See figure 10.
- 2- Remove and retain screws securing hood to unit.
- 3- Lift (rotate) the bottom of the hood top panel and attach left side to hood top panel. See figure 11.
- 4- Secure sides of hood to unit mullions with retained screws.
- 5- Caulk hinge opening on each end of air hood.
- 6- 240 Units Only - Remove two support brackets from hood top panel flange. See figure 12. Install as shown in figure 11.

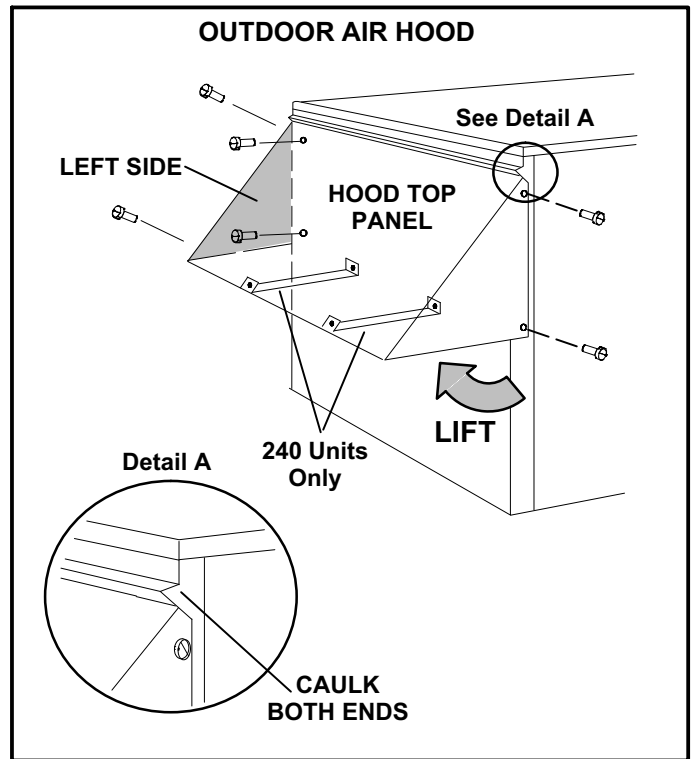


FIGURE 11

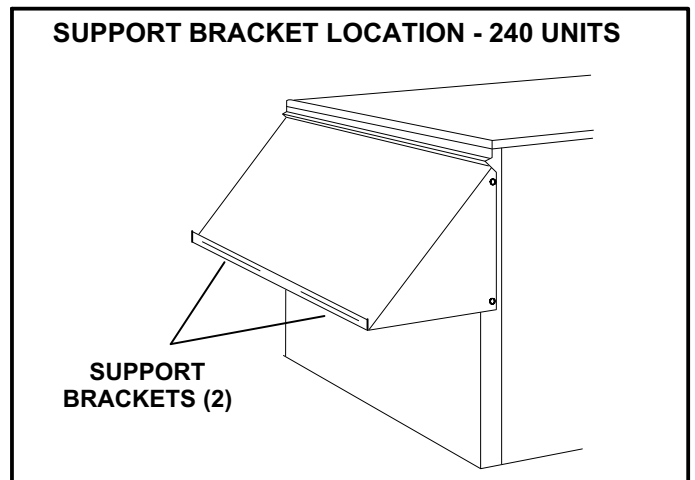


FIGURE 12

240 Units With Hood Filter Option

Outdoor air hood is shipped folded down over the horizontal supply air opening. The intake hood filters and support brackets are shipped unassembled in the blower compartment. Install as follows:

- 1- Remove left side from hood top panel. See figure 10.
- 2- Remove and retain screws securing hood to unit.
- 3- Lift (rotate) the bottom of the hood top panel and attach left side to hood top panel. See figure 11.
- 4- Secure sides of hood to unit mullions with retained screws.
- 5- Caulk hinge opening on each end of air hood.
- 6- Install back filter bracket on unit division panel as shown in figure 14.
- 7- Secure side seals to the hood sides as shown in figure 15.
- 8- Install longer front filter bracket on hood top as shown in figures 13 and 14. Insert four filters.
- 9- Slide fifth filter into back filter bracket and hold in place at the top of the opening with the shorter front bracket. Align holes on hood with bracket holes and secure filter bracket with sheet metal screws.

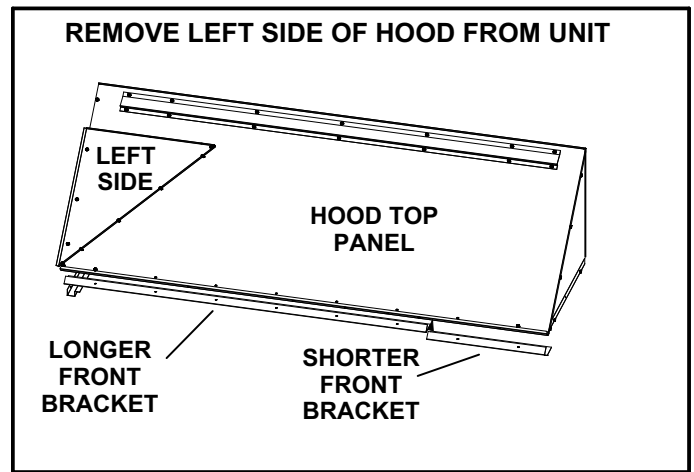


FIGURE 13

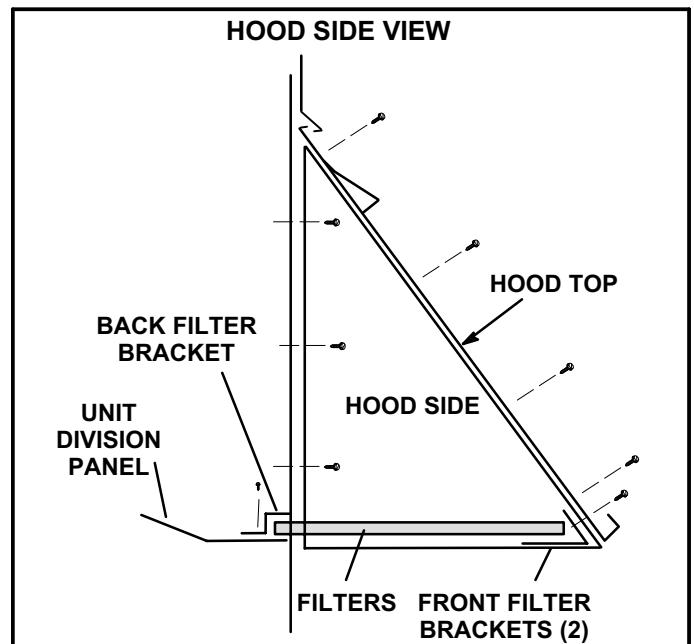


FIGURE 14

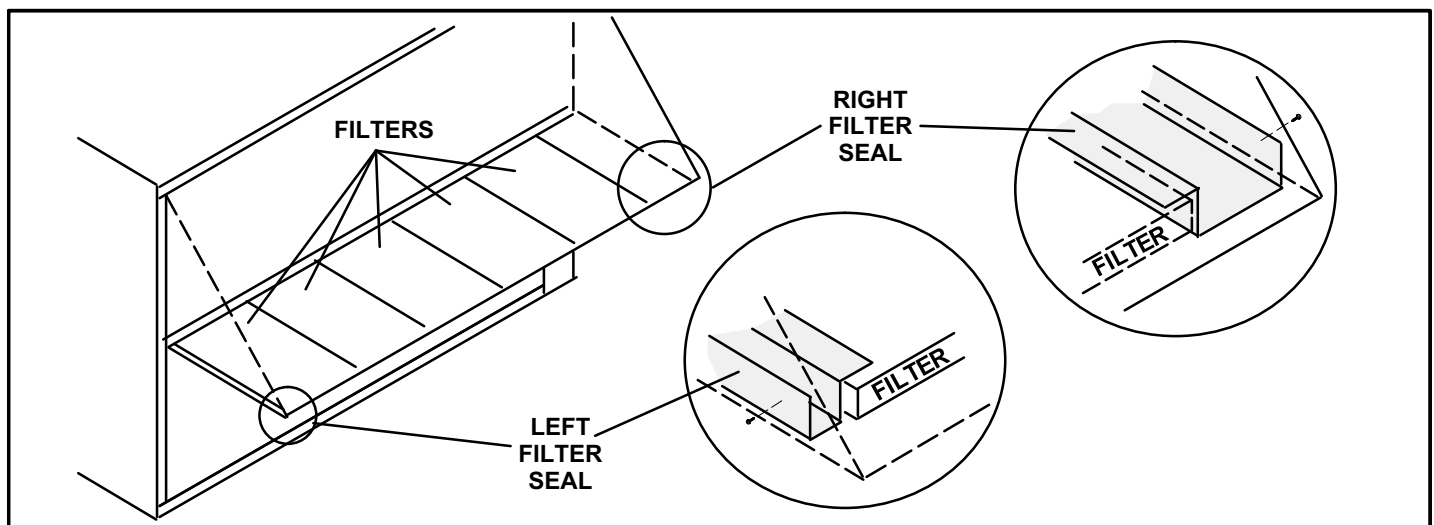


FIGURE 15

Electrical Connections

POWER SUPPLY

Do not apply power or close disconnect switch until installation is complete. Refer to start-up directions. Refer closely to unit wiring diagram.

Refer to unit nameplate for minimum circuit ampacity and maximum fuse size.

- 1- Units are factory-wired for 230,460,575 volt supply. **For 208V supply**, remove the insulated terminal cover from the 208V terminal on the control transformer. Move the wire from the transformer 240V terminal to the 208V terminal. Place the insulated terminal cover on the unused 240V terminal.
- 2- Route power through the bottom power entry area and connect to line side of unit circuit breaker. See unit wiring diagram.
- 3- Connect separate 120v wiring to GFCI outlet terminal strip in bottom power entry area.

CONTROL WIRING

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hands and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

A-Thermostat Location

Room thermostat mounts vertically on a standard 2" X 4" handy box or on any non-conductive flat surface.

Locate thermostat approximately 5 feet (1524mm) above the floor in an area with good air circulation at average temperature. Avoid locating the room thermostat where it might be affected by:

- drafts or dead spots behind doors and in corners
- hot or cold air from ducts
- radiant heat from sun or appliances
- concealed pipes and chimneys

B-Control Wiring

The Unit Controller will operate the unit from a thermostat or zone sensor based on the System Mode. The default System Mode is the thermostat mode. Refer to the Unit Controller Installation and Setup Guide to change the System Mode. Use the menu navigation arrows and select button; see Settings - Install.

Thermostat Mode

- 1- Route thermostat cable or wires from subbase through knockout provided in unit. For thermostat wire runs up to 60 feet, use 18 gauge wire. For 60 to 90 feet runs, use 16 gauge wire.

IMPORTANT - Unless field thermostat wires are rated for maximum unit voltage, they must be routed away from line voltage wiring. Use wire ties located near the lower left corner of the controls mounting panel to secure thermostat cable.

- 2- Install thermostat assembly in accordance with instructions provided with thermostat.
- 3- Connect thermostat wiring to Unit Controller on the lower side of the controls hat section.
- 4- Wire as shown in figure 16 for electro-mechanical and electronic thermostats. If using other temperature control devices or energy management systems see instructions and wiring diagram provided by manufacturer.

IMPORTANT-Terminal connections at the wall plate or subbase must be made securely. Loose control wire connections may allow unit to operate but not with proper response to room demand.

Zone Sensor Mode

The Unit Controller will operate heating and cooling based on the Unit Controller internal setpoints and the temperature from the A2 zone sensor. An optional Network Control Panel (NCP) can also be used to provide setpoints. A thermostat or return air sensor can be used as a back-up mode. Make zone sensor wiring connections as shown in figure 17.

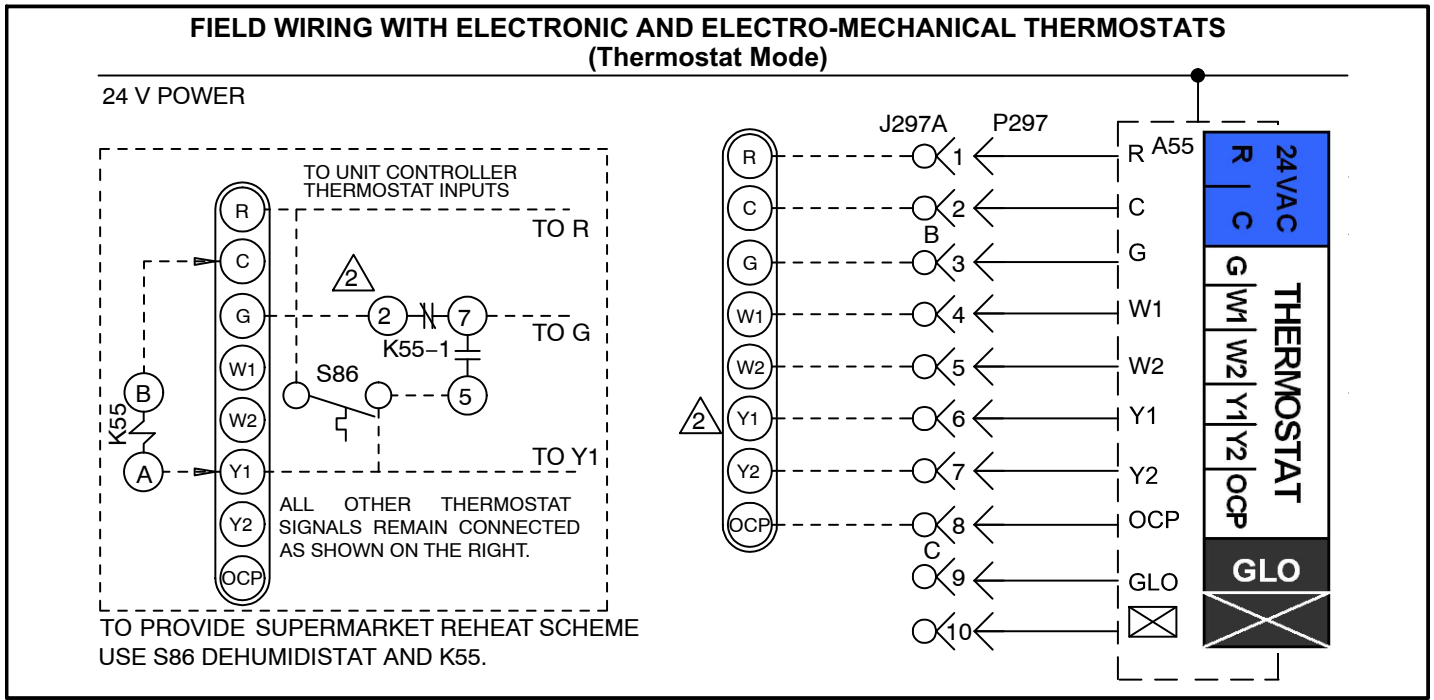


FIGURE 16

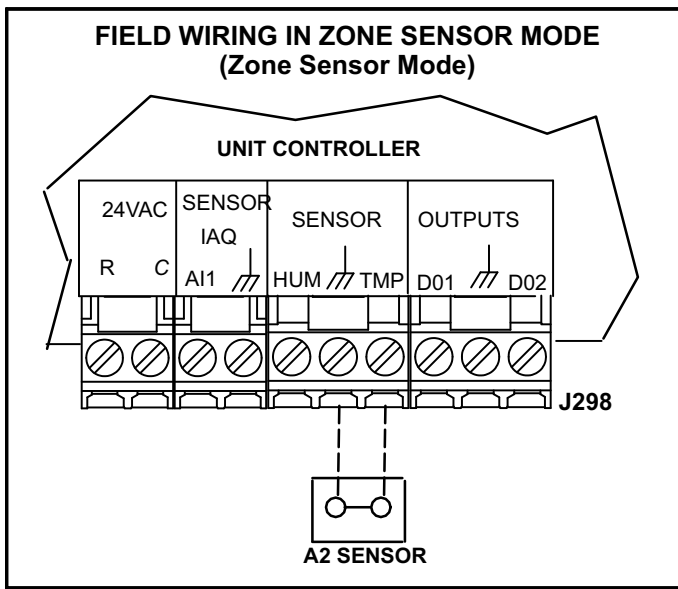


FIGURE 17

C-Hot Gas Reheat or Ultra High Efficiency Units Only -

- 1- Install humidity sensor in accordance with instructions provided with sensor. A DDC input may be used to initiate dehumidification instead of a sensor.
- 2- Make wiring connections as shown in figure 16 for Thermostat Mode or figure 17 for Zone Sensor Mode. In addition, connect either a humidity sensor or a dehumidification input. See figure 18 or 19 for humidity sensor wiring or figure 20 for dehumidification input wiring.

Humidity Sensor Cable Applications:

Wire runs of 50 feet (mm) or less:

Use two separate shielded cables containing 20AWG minimum, twisted pair conductors with overall shield. Belden type 8762 or 88760 (plenum) or equivalent. Connect both cable shield drain wires to the Unit Controller as shown in figure 18.

Wire runs of 150 feet (mm) or less:

Use two separate shielded cables containing 18AWG minimum, twisted pair conductors with overall shield. Belden type 8760 or 88760 (plenum) or equivalent. Connect both cable shield drain wires to the Unit Controller as shown in figure 18.

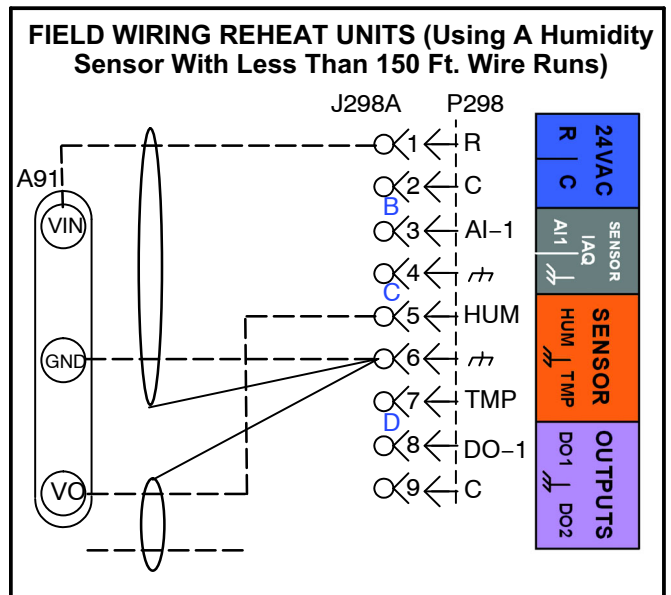


FIGURE 18

DIRECT DRIVE BLOWER ASSEMBLY (SG / SC 036 & 060)

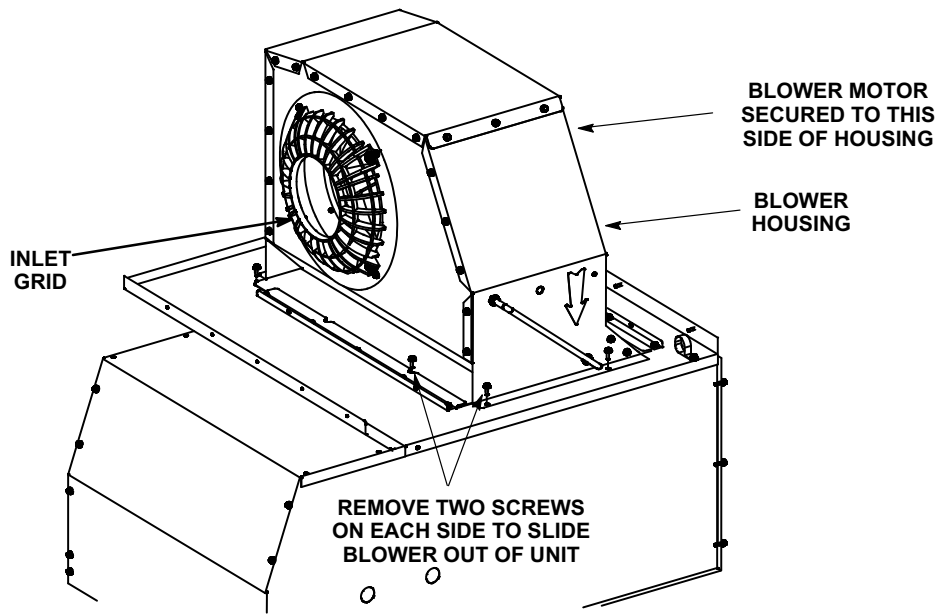


FIGURE 21

TO INCREASE BELT TENSION

BLOWER ASSEMBLY (SG / SC 120)

- 1-Loosen front and back screws securing pivoting motor base to slotted arm.
 - 2-Turn adjusting bolt to the right, or clockwise, to move the motor outward and tighten the belt.
 - 3-Tighten pivoting base screw on motor pulley (front) side.
- IMPORTANT - Align top edges of pivoting motor base and mounting frame base parallel before tightening the screw on the back side of base. Motor shaft and blower shaft must be parallel.*
- 4-Tighten pivoting base screw on back side of base.

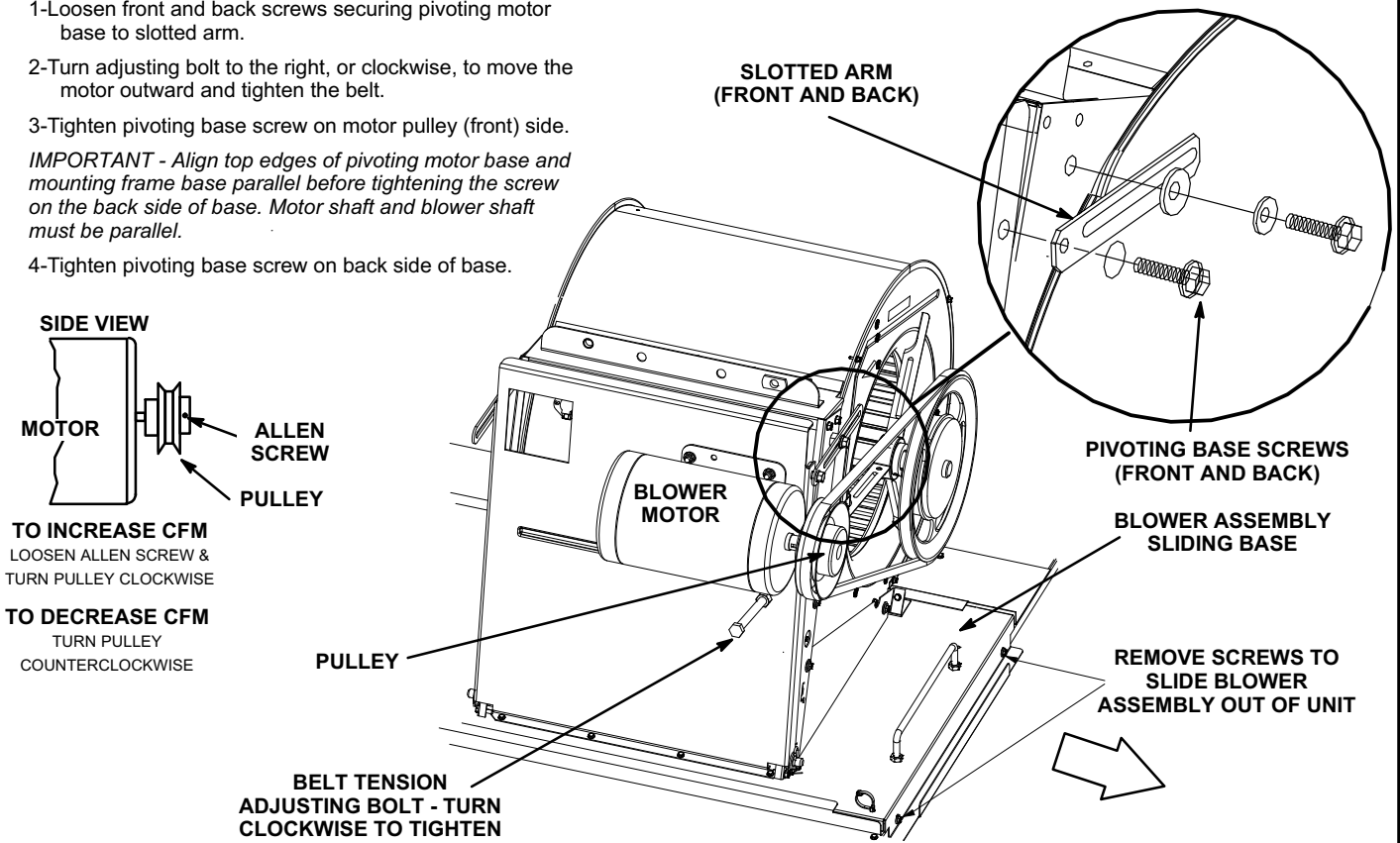


FIGURE 22

BLOWER ASSEMBLY (SG/SC 240)

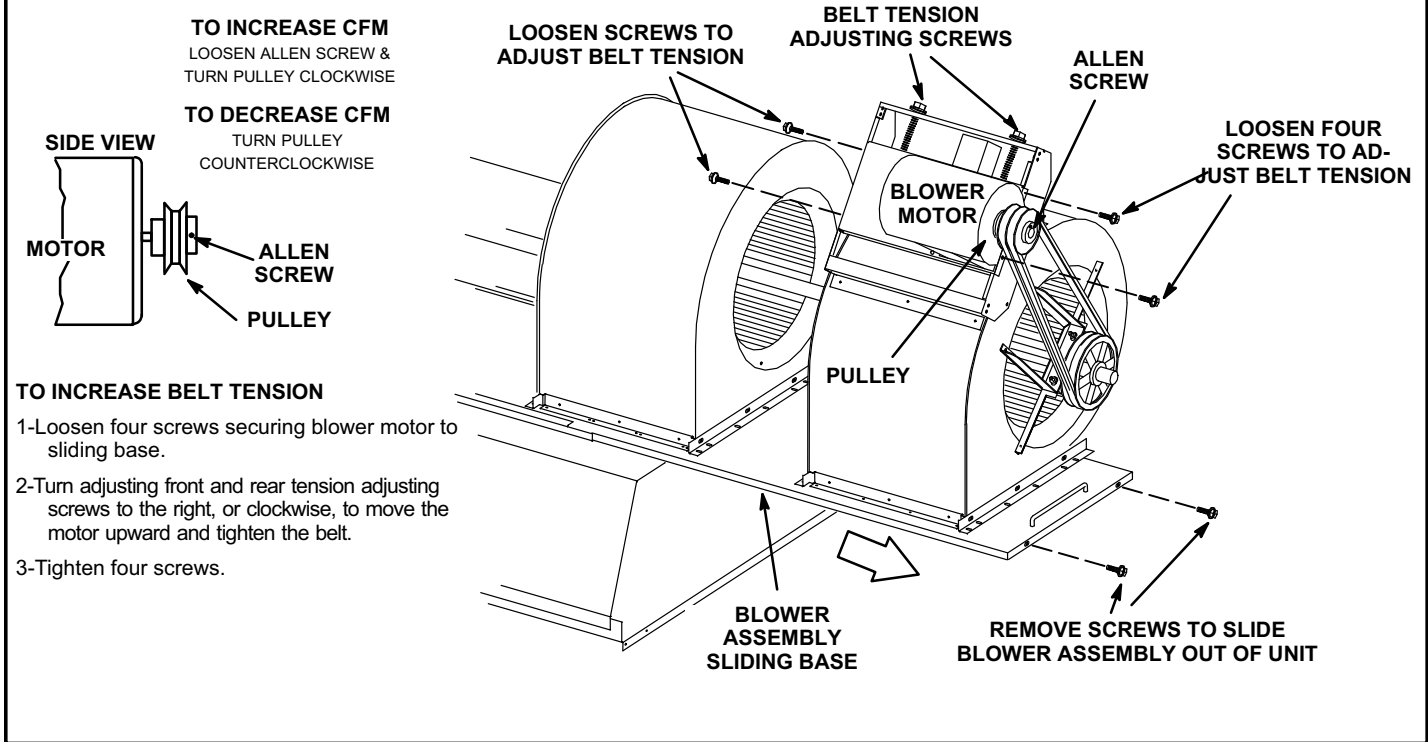


FIGURE 23

LOCATION OF STATIC PRESSURE READINGS

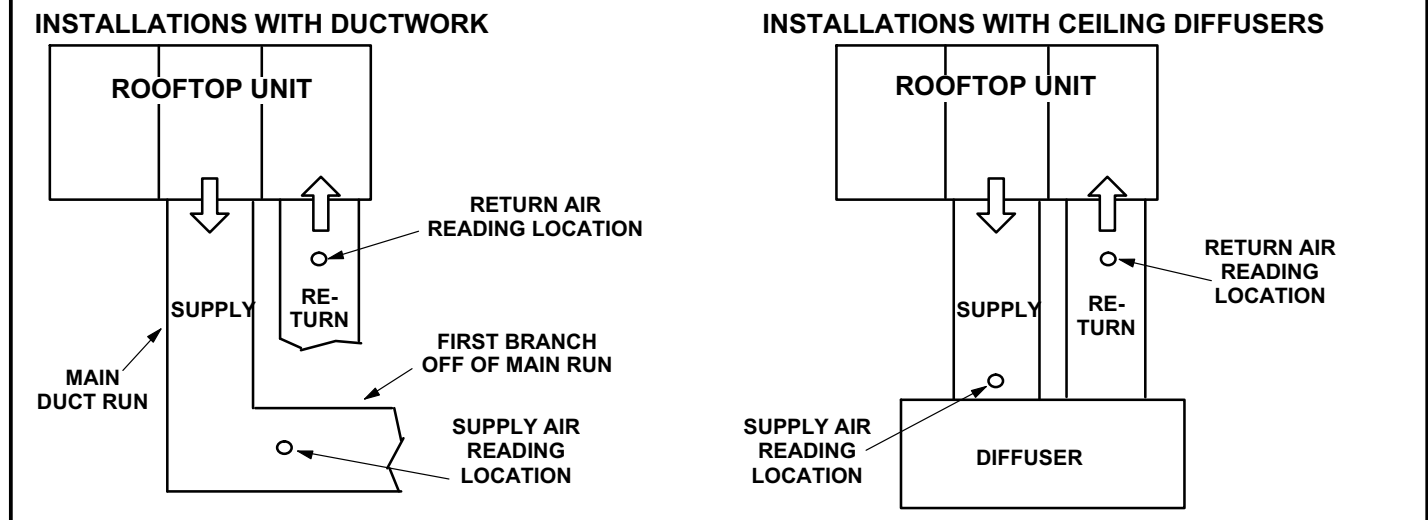


FIGURE 24

C-Determining Unit CFM (with wet coil)

Belt Drive Blowers Controlled By An Inverter

IMPORTANT - MSAV™ units are factory-set to run the blower at full speed when there is a blower (G) demand without a heating or cooling demand. Refer to the field-provided, design specified CFM for all modes of operation. Use the following procedure to adjust motor pulley to deliver the highest CFM called for in the design spec. See MSAV™ Start-Up section to set blower CFM for all modes once the motor pulley is set.

IMPORTANT - Direct drive variable blower unit CFM is determined by the Unit Controller. Refer to the Direct Drive Variable Speed Start-Up section.

- 1- Measure the indoor blower motor RPM. Air filters must be in place when measurements are taken.
- 2- With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in figure 24.

Note - Static pressure readings can vary if not taken where shown.

- 3- Referring to tables 7 through 10, use static pressure and RPM readings to determine unit CFM.
- 4- The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See figure 21, 22, or 23. Do not exceed minimum and maximum number of pulley turns as shown in table 2.

TABLE 2
Minimum and Maximum Pulley Adjustment

Belt	Minimum Turns Open	Maximum Turns Open
A Section	0	5
B Section	1*	6

*No minimum number of turns open when B belt is used on pulleys 6" O.D. or larger.

D-Adjust Belt Tension

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belt after a 24-48 hour period of operation. This will allow belt to stretch and seat to grooves. Make sure blower and motor pulley are aligned as shown in figure 25. See figure 21, 22 or 23 to adjust belt tension.

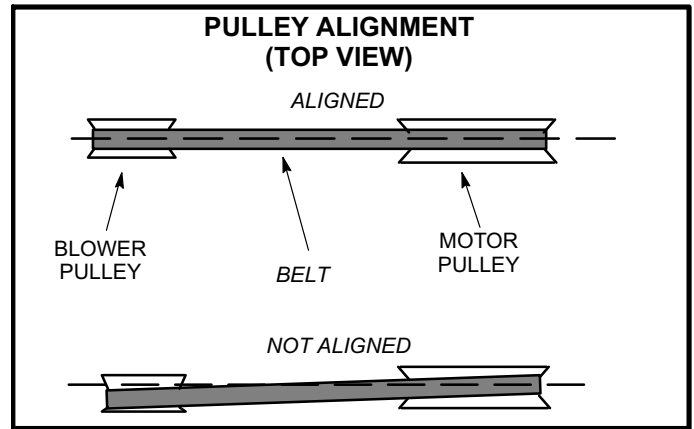


FIGURE 25

E-Check Belt Tension

Overtensioning belts shortens belt and bearing life. Check belt tension as follows:

- 1- Measure span length X. See figure 26.
- 2- Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 0.4mm per 25.4mm of span length.

Example: Deflection distance of a 40" span would be 40/64" or 5/8".

Example: Deflection distance of a 1016mm span would be 16mm.

- 3- Measure belt deflection force. The deflection force should be 7.0 lbs.

A force below these values indicates an undertensioned belt. A force above these values indicates an overtensioned belt.

F-Blower Drives

Use the following belt drive tables to determine BHP and RPM required. Reference table 12 to determine the drive numbers and table 13 and 14 to determine the manufacturer's model number.

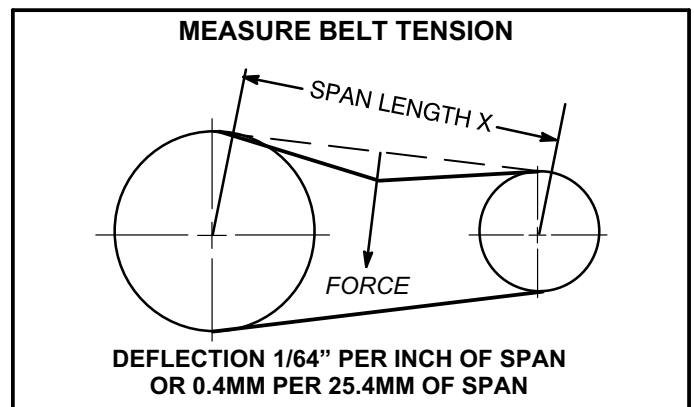


FIGURE 26

BLOWER DATA

DIRECT DRIVE | 3 - 5 TON

SGH036H / SGH060H BLOWER PERFORMANCE

NOTE - Blower Table Includes Resistance For Base Unit With Gas Heat, Wet Indoor Coil And Air Filters In Place.

EXTERNAL STATIC PRESSURE - In. w.g.

Air Volume cfm	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0		1.1		1.2		1.3		1.4	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
900	1296	48	1351	79	1408	110	1465	139	1523	167	1580	194	1636	220	1692	244	1746	268	1798	291	1849	312	1898	334	1945	355	1990	375
1000	1394	95	1449	125	1505	154	1562	182	1618	208	1674	234	1729	258	1782	282	1834	305	1884	328	1933	350	1980	372	2025	394	2069	417
1100	1495	141	1550	170	1606	197	1661	223	1717	249	1771	273	1824	297	1875	321	1925	344	1973	367	2020	390	2065	414	2108	438	2152	464
1200	1599	186	1654	213	1709	239	1764	264	1818	289	1870	313	1921	337	1970	362	2018	386	2064	411	2109	436	2153	461	2195	487	2238	516
1300	1707	230	1762	256	1816	281	1869	306	1921	331	1971	356	2020	381	2068	407	2114	433	2158	460	2202	486	2244	513	2285	542	2327	573
1400	1819	273	1873	299	1926	324	1977	350	2027	377	2075	404	2122	431	2168	459	2212	486	2255	515	2297	543	2338	572	2378	602	2419	635
1500	1935	318	1987	345	2037	372	2086	400	2134	429	2180	458	2225	487	2269	517	2312	546	2354	576	2395	607	2435	637	2474	669	2513	704
1600	2052	368	2102	397	2150	427	2197	457	2242	488	2287	519	2331	550	2373	582	2415	613	2455	645	2495	678	2534	710	2572	744	2610	779
1700	2169	426	2217	457	2263	489	2308	521	2352	554	2395	587	2437	621	2479	654	2519	688	2558	722	2597	757	2635	791	2672	827	2708	862
1800	2286	491	2332	524	2377	558	2420	593	2463	628	2505	664	2545	700	2585	735	2624	771	2663	808	2700	844	2737	882	2773	919	2808	956
1900	2404	565	2448	600	2491	637	2533	674	2574	711	2615	749	2654	787	2693	825	2731	863	2768	902	2805	941	2841	980	2875	1020	2910	1058
2000	2522	648	2564	685	2606	724	2647	764	2687	803	2726	843	2764	883	2802	924	2839	964	2875	1004	2910	1045	2945	1085	2979	1125	3013	1163
2100	2640	739	2681	779	2722	821	2761	863	2800	904	2838	946	2875	988	2911	1029	2947	1071	2982	1111	3017	1152	---	---	---	---	---	---
2200	2759	840	2799	884	2838	927	2876	970	2913	1013	2950	1055	2986	1097	3021	1139	---	---	---	---	---	---	---	---	---	---	---	---
2300	2878	950	2916	995	2954	1039	2991	1082	3027	1125	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2400	2997	1066	3033	1110	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2500	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

SGH120HM BLOWER PERFORMANCE

NOTE - Blower Table Includes Resistance For Base Unit With Gas Heat, Wet Indoor Coil And Air Filters In Place. See Blower Motor / Drive Kit Table on page 27 for Motor HP and Drive Kit RPM Ranges Available.

Air Volume cfm	EXTERNAL STATIC PRESSURE - In. w.g.																										
	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0		1.1		1.2		1.3		
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM
2000	439	0.31	480	0.40	522	0.48	565	0.56	607	0.63	647	0.70	685	0.76	719	0.82	753	0.90	785	0.99	816	1.09	846	1.18	874	1.27	
2200	454	0.38	496	0.47	538	0.56	581	0.63	622	0.71	661	0.78	698	0.84	732	0.92	765	1.01	798	1.11	830	1.21	859	1.31	887	1.41	
2400	470	0.45	512	0.55	555	0.64	598	0.72	638	0.79	676	0.87	711	0.94	745	1.02	779	1.13	813	1.24	845	1.35	875	1.46	902	1.55	
2600	487	0.53	530	0.63	573	0.72	615	0.81	655	0.89	691	0.97	726	1.05	760	1.14	795	1.26	829	1.39	861	1.51	892	1.62	920	1.71	
2800	506	0.62	549	0.73	592	0.82	634	0.91	672	0.99	707	1.08	741	1.17	776	1.28	811	1.42	846	1.55	879	1.67	909	1.79	938	1.89	
3000	525	0.72	569	0.83	613	0.93	653	1.02	689	1.11	724	1.20	758	1.31	793	1.44	829	1.58	864	1.72	897	1.85	928	1.97	956	2.08	
3200	547	0.84	591	0.95	634	1.05	672	1.14	707	1.23	741	1.34	776	1.47	812	1.61	848	1.76	883	1.91	916	2.04	946	2.16	975	2.28	
3400	570	0.96	614	1.07	655	1.18	692	1.28	726	1.38	759	1.51	794	1.65	831	1.81	867	1.96	901	2.11	934	2.25	965	2.37	993	2.48	
3600	594	1.09	638	1.21	676	1.32	711	1.43	744	1.55	778	1.69	814	1.85	850	2.01	886	2.18	920	2.33	953	2.47	983	2.59	1011	2.70	
3800	620	1.24	661	1.36	698	1.48	731	1.60	763	1.73	797	1.89	833	2.06	869	2.24	904	2.40	939	2.55	971	2.69	1001	2.81	1029	2.92	
4000	647	1.40	685	1.53	719	1.66	751	1.79	782	1.94	816	2.11	852	2.29	887	2.47	923	2.63	957	2.78	988	2.91	1018	3.03	1047	3.14	
4200	672	1.58	707	1.72	740	1.85	771	2.00	801	2.16	834	2.34	870	2.53	905	2.71	940	2.87	974	3.02	1005	3.14	1035	3.26	1064	3.36	
4400	696	1.78	729	1.93	760	2.07	790	2.22	820	2.39	852	2.59	887	2.78	922	2.95	957	3.11	990	3.25	1021	3.37	1051	3.48	1080	3.58	
4600	719	2.00	751	2.14	781	2.29	810	2.45	839	2.63	869	2.83	903	3.03	938	3.20	972	3.36	1005	3.49	1037	3.60	1067	3.71	1097	3.81	
4800	742	2.23	772	2.37	801	2.52	829	2.69	857	2.87	886	3.08	919	3.28	953	3.45	987	3.60	1020	3.72	1052	3.83	1083	3.93	1113	4.03	

NOTE - Multi-Stage Air Volume drive is capable of 350 - 1050 rpm.

SGH240HM BLOWER PERFORMANCE

NOTE - Blower Table Includes Resistance For Base Unit With Gas Heat. Wet Indoor Coil And Air Filters In Place.
See Blower Motor / Drive Kit Table on page 27 for Motor HP and Drive Kit RPM Ranges Available.

EXTERNAL STATIC PRESSURE - In. w.g.

Air Volume cfm	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0		1.1		1.2		1.3		
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM
2000	255	0.33	310	0.48	366	0.63	416	0.74	458	0.81	498	0.89	537	0.99	573	1.10	607	1.22	642	1.35	677	1.49	712	1.65	749	1.80	
2200	258	0.37	313	0.52	369	0.67	418	0.78	460	0.85	500	0.92	538	1.03	574	1.15	609	1.27	643	1.40	678	1.55	714	1.70	751	1.86	
2400	261	0.40	316	0.56	372	0.70	421	0.81	462	0.88	502	0.96	540	1.07	576	1.19	610	1.32	645	1.45	680	1.60	716	1.76	753	1.92	
2600	265	0.44	319	0.60	375	0.74	423	0.85	464	0.92	505	1.00	542	1.11	578	1.24	612	1.37	646	1.51	682	1.66	718	1.82	755	1.98	
2800	268	0.48	322	0.63	378	0.77	426	0.89	467	0.95	507	1.04	545	1.16	580	1.29	614	1.42	648	1.56	684	1.72	720	1.88	757	2.04	
3000	272	0.51	326	0.67	382	0.81	429	0.92	470	0.99	510	1.09	547	1.21	582	1.34	616	1.48	650	1.63	686	1.78	723	1.94	759	2.10	
3200	276	0.55	330	0.71	386	0.85	433	0.96	473	1.03	513	1.13	550	1.26	584	1.40	618	1.54	652	1.69	688	1.85	725	2.01	762	2.16	
3400	280	0.59	335	0.74	391	0.88	437	1.00	477	1.08	516	1.18	552	1.32	587	1.46	620	1.61	655	1.76	691	1.91	727	2.07	764	2.23	
3600	285	0.62	340	0.78	395	0.92	441	1.04	480	1.12	520	1.24	555	1.38	589	1.53	623	1.67	657	1.83	693	1.98	730	2.14	767	2.30	
3800	290	0.66	345	0.81	400	0.96	445	1.08	484	1.17	523	1.29	559	1.44	592	1.59	626	1.74	660	1.90	696	2.06	733	2.22	770	2.38	
4000	296	0.69	351	0.85	406	0.99	449	1.12	488	1.22	527	1.35	562	1.51	595	1.66	629	1.82	663	1.97	699	2.14	736	2.30	773	2.46	
4200	301	0.73	358	0.88	411	1.03	453	1.17	493	1.27	531	1.41	565	1.57	599	1.73	632	1.89	666	2.05	702	2.22	739	2.39	776	2.56	
4400	308	0.76	364	0.92	416	1.07	458	1.22	497	1.33	534	1.48	569	1.64	602	1.81	635	1.97	670	2.14	706	2.31	743	2.48	779	2.66	
4600	315	0.80	371	0.95	422	1.12	463	1.26	502	1.39	539	1.54	573	1.71	606	1.88	639	2.05	673	2.22	710	2.40	746	2.58	783	2.76	
4800	322	0.83	378	0.99	427	1.16	468	1.32	507	1.45	543	1.62	577	1.79	609	1.96	642	2.14	677	2.32	714	2.50	751	2.69	788	2.87	
5000	330	0.86	386	1.03	433	1.21	473	1.38	512	1.52	547	1.69	581	1.87	613	2.05	647	2.22	682	2.41	718	2.60	755	2.79	792	2.98	
5200	338	0.89	393	1.07	438	1.27	478	1.44	517	1.59	551	1.77	585	1.95	617	2.13	651	2.32	686	2.50	722	2.70	759	2.89	796	3.08	
5400	346	0.92	400	1.12	444	1.33	484	1.51	522	1.67	556	1.86	589	2.04	622	2.23	655	2.41	690	2.60	727	2.79	764	2.98	801	3.17	
5600	355	0.96	407	1.17	450	1.40	490	1.58	528	1.76	561	1.96	594	2.14	626	2.33	660	2.51	695	2.70	732	2.89	769	3.08	806	3.27	
5800	364	1.00	414	1.23	457	1.47	496	1.65	533	1.85	566	2.06	599	2.24	631	2.43	665	2.61	701	2.81	737	3.00	774	3.19	811	3.38	
6000	372	1.04	422	1.29	463	1.54	502	1.73	539	1.95	571	2.17	604	2.35	636	2.53	670	2.72	706	2.91	743	3.11	779	3.30	816	3.50	
6200	381	1.08	429	1.36	470	1.62	508	1.82	544	2.05	576	2.28	609	2.46	641	2.64	676	2.82	712	3.02	749	3.22	785	3.42	822	3.62	
6400	390	1.14	437	1.44	477	1.71	515	1.92	550	2.16	582	2.39	614	2.57	647	2.74	682	2.93	718	3.14	755	3.34	792	3.54	828	3.75	
6600	399	1.20	444	1.53	484	1.80	521	2.02	556	2.28	587	2.51	620	2.68	653	2.85	688	3.04	725	3.25	762	3.46	798	3.67	835	3.87	
6800	408	1.27	452	1.62	491	1.89	528	2.13	562	2.40	593	2.63	625	2.80	659	2.96	694	3.15	731	3.37	768	3.58	805	3.80	842	4.01	
7000	417	1.35	460	1.71	498	1.99	535	2.24	568	2.52	599	2.74	631	2.91	665	3.08	700	3.27	737	3.48	775	3.70	812	3.92	848	4.14	
7200	426	1.45	467	1.82	505	2.10	541	2.36	574	2.65	606	2.86	638	3.02	671	3.19	707	3.39	744	3.60	781	3.83	818	4.05	855	4.27	
7400	435	1.55	475	1.93	513	2.22	548	2.49	580	2.77	612	2.98	644	3.14	677	3.31	713	3.50	750	3.72	788	3.94	825	4.17	861	4.39	
7600	444	1.67	483	2.05	520	2.34	555	2.62	587	2.90	618	3.10	650	3.26	684	3.43	719	3.62	756	3.84	794	4.06	831	4.29	868	4.51	
7800	452	1.80	491	2.18	528	2.47	562	2.75	594	3.02	625	3.22	657	3.38	690	3.55	726	3.74	763	3.96	800	4.18	837	4.40	874	4.62	
8000	461	1.93	500	2.31	536	2.61	570	2.89	601	3.15	632	3.35	664	3.51	697	3.67	732	3.87	769	4.08	806	4.30	843	4.52	880	4.74	
8200	470	2.08	508	2.45	544	2.75	577	3.03	608	3.29	639	3.47	671	3.63	704	3.80	739	3.99	775	4.20	812	4.42	849	4.64	886	4.86	
8400	479	2.23	516	2.60	552	2.90	585	3.18	615	3.42	646	3.60	678	3.76	711	3.93	746	4.11	782	4.32	819	4.54	855	4.76	892	4.98	
8600	488	2.39	525	2.76	560	3.05	592	3.33	623	3.56	653	3.74	685	3.89	718	4.06	752	4.27	788	4.44	825	4.66	862	4.88	898	5.10	
8800	498	2.56	533	2.91	568	3.21	600	3.48	630	3.70	661	3.87	692	4.02	725	4.19	759	4.37	795	4.57	831	4.78	868	5.00	904	5.21	
9000	507	2.73	542	3.08	576	3.37	608	3.63	638	3.85	668	4.01	699	4.16	732	4.32	766	4.50	802	4.69	838	4.90	874	5.12	911	5.33	
9200	516	2.91	551	3.25	584	3.53	616	3.78	645	3.99	676	4.15	707	4.29	739	4.45	773	4.63	808	4.82	844	5.03	881	5.24	917	5.46	
9400	526	3.09	560	3.42	593	3.69	623	3.94	653	4.13	683	4.28	714	4.43	746	4.58	780	4.76	815	4.95	851	5.15	887	5.36	923	5.58	
9600	535	3.27	569	3.59	601	3.86	631	4.10	661	4.28	691	4.42	721	4.56	753	4.72	787	4.89	822	5.08	858	5.28	894	5.49	930	5.70	

BLOWER DATA

DIRECT DRIVE | 3 - 5 TON

SCH036H / SCH060H BLOWER PERFORMANCE

NOTE - Blower Table Includes Resistance For Base Unit With Electric Heat, Wet Indoor Coil And Air Filters In Place.

NOTE - MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT:

SCH036H - 1020 CFM

SCH060H - 1650 CFM

EXTERNAL STATIC PRESSURE - In. w.g.

Air Volume cfm	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0		1.1		1.2		1.3		1.4	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
900	1214	116	1294	144	1371	170	1444	194	1513	218	1578	240	1640	262	1699	283	1754	303	1808	322	1859	341	1911	360	1962	382	2014	405
1000	1308	144	1388	171	1463	196	1534	220	1601	243	1664	266	1723	288	1780	310	1834	331	1887	352	1938	373	1989	395	2040	419	2091	445
1100	1407	172	1485	198	1558	223	1627	247	1691	271	1752	294	1809	317	1864	339	1916	362	1968	385	2018	409	2068	434	2119	460	2169	489
1200	1512	201	1587	227	1657	252	1723	277	1784	301	1842	325	1897	349	1950	373	2001	398	2051	423	2101	449	2150	476	2199	505	2249	536
1300	1623	232	1693	258	1759	284	1822	309	1880	335	1935	360	1988	386	2039	412	2089	438	2138	466	2186	494	2234	524	2282	554	2329	586
1400	1738	266	1803	293	1865	320	1923	347	1979	373	2031	401	2082	428	2131	456	2179	485	2227	514	2274	545	2320	575	2366	607	2411	641
1500	1855	305	1915	333	1973	361	2028	389	2080	418	2130	447	2178	477	2226	507	2273	537	2318	568	2363	600	2408	632	2451	665	2495	699
1600	1973	349	2029	379	2083	408	2134	438	2183	469	2231	500	2277	531	2323	563	2368	595	2412	627	2455	660	2497	693	2539	727	2579	762
1700	2090	399	2143	430	2193	462	2241	494	2287	526	2333	558	2377	591	2421	624	2464	658	2506	691	2547	725	2588	759	2627	794	2666	829
1800	2206	456	2255	488	2303	522	2348	555	2392	589	2436	623	2478	657	2520	691	2561	725	2601	760	2640	795	2679	830	2716	865	2753	901
1900	2321	519	2368	553	2412	588	2455	622	2498	657	2539	692	2579	727	2619	762	2658	798	2696	833	2734	869	2770	905	2806	941	2841	978
2000	2435	589	2479	624	2521	660	2562	695	2602	731	2642	767	2680	803	2718	839	2755	875	2791	911	2827	947	2862	984	2896	1021	2931	1058
2100	2547	665	2589	701	2629	737	2668	774	2706	810	2744	847	2780	883	2816	919	2851	956	2886	992	2920	1029	2954	1066	2987	1103	3021	1140
2200	2659	746	2698	783	2736	820	2773	857	2809	894	2844	931	2879	967	2913	1003	2947	1040	2980	1076	3013	1112	3046	1149	3080	1185	3113	1221
2300	2770	834	2806	871	2842	908	2877	945	2911	981	2945	1017	2978	1053	3010	1089	1125	1161	1197	1233	1269	1305	1341	1377	1413	1449	1485	1521
2400	2879	925	2913	962	2947	999	2980	1035	3012	1070	1106	1142	1178	1214	1250	1286	1322	1358	1394	1430	1466	1502	1538	1574	1610	1646	1682	1718
2500	2987	1020	3019	1055	3051	1086	3087	1122	3112	1147	3147	1182	1217	1252	1287	1322	1357	1392	1427	1462	1497	1532	1567	1602	1637	1672	1707	1742

BLOWER DATA

BELT DRIVE | 10 TON

SCH120HM BLOWER PERFORMANCE

NOTE - Blower Table Includes Resistance For Base Unit With Electric Heat, Wet Indoor Coil And Air Filters In Place.

NOTE - MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT - 3800 CFM.

See Blower Motor / Drive Kit Table on page 27 for Motor HP and Drive Kit RPM Ranges Available.

Air Volume cfm	EXTERNAL STATIC PRESSURE - In. w.g.																									
	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0		1.1		1.2		1.3	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2000	418	0.26	453	0.33	490	0.41	530	0.48	573	0.55	617	0.62	658	0.68	697	0.76	734	0.84	767	0.93	797	1.01	825	1.09	852	1.17
2200	430	0.34	465	0.42	502	0.49	543	0.56	586	0.63	630	0.70	671	0.78	709	0.86	745	0.95	778	1.04	807	1.12	835	1.21	863	1.29
2400	444	0.44	478	0.50	516	0.57	557	0.65	601	0.72	644	0.80	683	0.88	721	0.97	757	1.07	789	1.16	818	1.25	847	1.33	875	1.41
2600	458	0.53	493	0.60	530	0.67	572	0.74	616	0.82	658	0.91	697	1.00	734	1.09	769	1.19	801	1.29	830	1.38	859	1.46	888	1.55
2800	473	0.63	508	0.70	547	0.77	589	0.85	632	0.93	673	1.03	711	1.13	747	1.23	781	1.33	813	1.43	843	1.52	872	1.60	902	1.69
3000	489	0.74	525	0.81	564	0.89	607	0.97	649	1.06	688	1.16	725	1.27	761	1.38	795	1.48	826	1.58	857	1.66	887	1.75	918	1.84
3200	506	0.86	543	0.93	583	1.01	625	1.10	666	1.20	703	1.31	740	1.42	775	1.53	809	1.64	841	1.73	871	1.82	902	1.91	934	2.01
3400	525	0.99	563	1.07	603	1.15	644	1.24	682	1.36	719	1.48	755	1.59	790	1.70	824	1.80	856	1.90	887	1.99	919	2.08	951	2.18
3600	545	1.13	583	1.21	623	1.30	662	1.41	699	1.53	735	1.65	771	1.77	806	1.87	840	1.97	872	2.07	903	2.16	936	2.25	969	2.36
3800	566	1.28	604	1.36	643	1.46	679	1.58	715	1.71	752	1.84	788	1.95	823	2.06	856	2.16	889	2.25	921	2.34	954	2.43	987	2.54
4000	587	1.44	625	1.53	661	1.64	697	1.78	733	1.91	770	2.03	806	2.15	841	2.25	874	2.34	906	2.43	938	2.52	971	2.61	1005	2.71
4200	609	1.60	645	1.71	680	1.85	715	1.99	751	2.12	788	2.24	825	2.35	859	2.44	892	2.53	924	2.62	957	2.71	989	2.80	1023	2.89
4400	629	1.79	664	1.92	698	2.07	734	2.21	771	2.34	808	2.45	844	2.55	878	2.64	911	2.73	943	2.81	975	2.89	1008	2.98	1041	3.08
4600	650	2.00	683	2.15	717	2.30	753	2.44	791	2.56	829	2.66	864	2.76	897	2.84	930	2.92	962	3.00	994	3.08	1026	3.17	1060	3.26
4800	669	2.23	702	2.39	737	2.55	774	2.67	813	2.78	850	2.88	884	2.97	917	3.05	949	3.12	981	3.20	1013	3.28	1045	3.36	1079	3.45

NOTE - Multi-Stage Air Volume drive is capable of 350 - 1050 rpm.

BLOWER DATA

BELT DRIVE | 20 TON

SCH240HM BLOWER PERFORMANCE

NOTE - Blower Table Includes Resistance For Base Unit With Electric Heat, Wet Indoor Coil And Air Filters In Place.

NOTE - MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT - 8000 CFM.

See Blower Motor / Drive Kit Table on page 27 for Motor HP and Drive Kit RPM Ranges Available.

EXTERNAL STATIC PRESSURE - In. w.g.

Air Volume cfm	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8		0.9		1.0		1.1		1.2		1.3		
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM
2000	255	0.33	310	0.48	366	0.63	416	0.74	458	0.81	498	0.89	537	0.99	573	1.10	607	1.22	642	1.35	677	1.49	712	1.65	749	1.80	
2200	258	0.37	313	0.52	369	0.67	418	0.78	460	0.85	500	0.92	538	1.03	574	1.15	609	1.27	643	1.40	678	1.55	714	1.70	751	1.86	
2400	261	0.40	316	0.56	372	0.70	421	0.81	462	0.88	502	0.96	540	1.07	576	1.19	610	1.32	645	1.45	680	1.60	716	1.76	753	1.92	
2600	265	0.44	319	0.60	375	0.74	423	0.85	464	0.92	505	1.00	542	1.11	578	1.24	612	1.37	646	1.51	682	1.66	718	1.82	755	1.98	
2800	268	0.48	322	0.63	378	0.77	426	0.89	467	0.95	507	1.04	545	1.16	580	1.29	614	1.42	648	1.56	684	1.72	720	1.88	757	2.04	
3000	272	0.51	326	0.67	382	0.81	429	0.92	470	0.99	510	1.09	547	1.21	582	1.34	616	1.48	650	1.63	686	1.78	723	1.94	759	2.10	
3200	276	0.55	330	0.71	386	0.85	433	0.96	473	1.03	513	1.13	550	1.26	584	1.40	618	1.54	652	1.69	688	1.85	725	2.01	762	2.16	
3400	280	0.59	335	0.74	391	0.88	437	1.00	477	1.08	516	1.18	552	1.32	587	1.46	620	1.61	655	1.76	691	1.91	727	2.07	764	2.23	
3600	285	0.62	340	0.78	395	0.92	441	1.04	480	1.12	520	1.24	555	1.38	589	1.53	623	1.67	657	1.83	693	1.98	730	2.14	767	2.30	
3800	290	0.66	345	0.81	400	0.96	445	1.08	484	1.17	523	1.29	559	1.44	592	1.59	626	1.74	660	1.90	696	2.06	733	2.22	770	2.38	
4000	296	0.69	351	0.85	406	0.99	449	1.12	488	1.22	527	1.35	562	1.51	595	1.66	629	1.82	663	1.97	699	2.14	736	2.30	773	2.46	
4200	301	0.73	358	0.88	411	1.03	453	1.17	493	1.27	531	1.41	565	1.57	599	1.73	632	1.89	666	2.05	702	2.22	739	2.39	776	2.56	
4400	308	0.76	364	0.92	416	1.07	458	1.22	497	1.33	534	1.48	569	1.64	602	1.81	635	1.97	670	2.14	706	2.31	743	2.48	779	2.66	
4600	315	0.80	371	0.95	422	1.12	463	1.26	502	1.39	539	1.54	573	1.71	606	1.88	639	2.05	673	2.22	710	2.40	746	2.58	783	2.76	
4800	322	0.83	378	0.99	427	1.16	468	1.32	507	1.45	543	1.62	577	1.79	609	1.96	642	2.14	677	2.32	714	2.50	751	2.69	788	2.87	
5000	330	0.86	386	1.03	433	1.21	473	1.38	512	1.52	547	1.69	581	1.87	613	2.05	647	2.22	682	2.41	718	2.60	755	2.79	792	2.98	
5200	338	0.89	393	1.07	438	1.27	478	1.44	517	1.59	551	1.77	585	1.95	617	2.13	651	2.32	686	2.50	722	2.70	759	2.89	796	3.08	
5400	346	0.92	400	1.12	444	1.33	484	1.51	522	1.67	556	1.86	589	2.04	622	2.23	655	2.41	690	2.60	727	2.79	764	2.98	801	3.17	
5600	355	0.96	407	1.17	450	1.40	490	1.58	528	1.76	561	1.96	594	2.14	626	2.33	660	2.51	695	2.70	732	2.89	769	3.08	806	3.27	
5800	364	1.00	414	1.23	457	1.47	496	1.65	533	1.85	566	2.06	599	2.24	631	2.43	665	2.61	701	2.81	737	3.00	774	3.19	811	3.38	
6000	372	1.04	422	1.29	463	1.54	502	1.73	539	1.95	571	2.17	604	2.35	636	2.53	670	2.72	706	2.91	743	3.11	779	3.30	816	3.50	
6200	381	1.08	429	1.36	470	1.62	508	1.82	544	2.05	576	2.28	609	2.46	641	2.64	676	2.82	712	3.02	749	3.22	785	3.42	822	3.62	
6400	390	1.14	437	1.44	477	1.71	515	1.92	550	2.16	582	2.39	614	2.57	647	2.74	682	2.93	718	3.14	755	3.34	792	3.54	828	3.75	
6600	399	1.20	444	1.53	484	1.80	521	2.02	556	2.28	587	2.51	620	2.68	653	2.85	688	3.04	725	3.25	762	3.46	798	3.67	835	3.87	
6800	408	1.27	452	1.62	491	1.89	528	2.13	562	2.40	593	2.63	625	2.80	659	2.96	694	3.15	731	3.37	768	3.58	805	3.80	842	4.01	
7000	417	1.35	460	1.71	498	1.99	535	2.24	568	2.52	599	2.74	631	2.91	665	3.08	700	3.27	737	3.48	775	3.70	812	3.92	848	4.14	
7200	426	1.45	467	1.82	505	2.10	541	2.36	574	2.65	606	2.86	638	3.02	671	3.19	707	3.39	744	3.60	781	3.83	818	4.05	855	4.27	
7400	435	1.55	475	1.93	513	2.22	548	2.49	580	2.77	612	2.98	644	3.14	677	3.31	713	3.50	750	3.72	788	3.94	825	4.17	861	4.39	
7600	444	1.67	483	2.05	520	2.34	555	2.62	587	2.90	618	3.10	650	3.26	684	3.43	719	3.62	756	3.84	794	4.06	831	4.29	868	4.51	
7800	452	1.80	491	2.18	528	2.47	562	2.75	594	3.02	625	3.22	657	3.38	690	3.55	726	3.74	763	3.96	800	4.18	837	4.40	874	4.62	
8000	461	1.93	500	2.31	536	2.61	570	2.89	601	3.15	632	3.35	664	3.51	697	3.67	732	3.87	769	4.08	806	4.30	843	4.52	880	4.74	
8200	470	2.08	508	2.45	544	2.75	577	3.03	608	3.29	639	3.47	671	3.63	704	3.80	739	3.99	775	4.20	812	4.42	849	4.64	886	4.86	
8400	479	2.23	516	2.60	552	2.90	585	3.18	615	3.42	646	3.60	678	3.76	711	3.93	746	4.11	782	4.32	819	4.54	855	4.76	892	4.98	
8600	488	2.39	525	2.76	560	3.05	592	3.33	623	3.56	653	3.74	685	3.89	718	4.06	752	4.24	788	4.44	825	4.66	862	4.88	898	5.10	
8800	498	2.56	533	2.91	568	3.21	600	3.48	630	3.70	661	3.87	692	4.02	725	4.19	759	4.37	795	4.57	831	4.78	868	5.00	904	5.21	
9000	507	2.73	542	3.08	576	3.37	608	3.63	638	3.85	668	4.01	699	4.16	732	4.32	766	4.50	802	4.69	838	4.90	874	5.12	911	5.33	
9200	516	2.91	551	3.25	584	3.53	616	3.78	645	3.99	676	4.15	707	4.29	739	4.45	773	4.63	808	4.82	844	5.03	881	5.24	917	5.46	
9400	526	3.09	560	3.42	593	3.69	623	3.94	653	4.13	683	4.28	714	4.43	746	4.58	780	4.76	815	4.95	851	5.15	887	5.36	923	5.58	
9600	535	3.27	569	3.59	601	3.86	631	4.10	661	4.28	691	4.42	721	4.56	753	4.72	787	4.89	822	5.08	858	5.28	894	5.49	930	5.70	

BLOWER DATA

MULTI-STAGE AIR VOLUME BELT DRIVE KIT SPECIFICATIONS

Model No.	Nominal / Maximum - hp	Drive Kit Number	RPM Range
120	3	#3	660 - 900
		#4	865 - 1080
240	5	#4	520 - 685
		#5	685 - 865
	7.5	#7	770 - 965

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE - in. w.g.

Air Volume cfm	Dehumidification Coil	Economizer	Filters MERV 13
036, 060 MODELS			
800	0.00	0.04	0.05
1000	0.00	0.04	0.07
1200	0.01	0.04	0.07
1400	0.02	0.04	0.07
1600	0.03	0.04	0.07
1800	0.04	0.05	0.07
2000	0.04	0.05	0.08
120 MODEL			
2000	0.03	0.06	0.03
2500	0.04	0.11	0.05
3000	0.05	0.13	0.06
3500	0.06	0.15	0.07
4000	0.08	0.19	0.08
4500	0.10	0.22	0.09
5000	0.12	0.29	0.10
5500	0.14	0.34	0.12
6000	0.15	0.52	0.13
240 MODEL			
3000	0.02	0.00	0.00
3500	0.04	0.00	0.00
4000	0.04	0.00	0.00
4500	0.04	0.00	0.00
5000	0.04	0.00	0.00
5500	0.06	0.01	0.01
6000	0.06	0.01	0.02
6500	0.08	0.01	0.02
7000	0.08	0.02	0.03
7500	0.10	0.02	0.04
8000	0.10	0.02	0.04
8500	0.10	0.03	0.04
9000	0.12	0.04	0.04
9500	0.14	0.04	0.06

POWER EXHAUST FANS STANDARD STATIC PERFORMANCE

120 Model		240 Model	
Return Air System Static Pressure	Air Volume Exhausted	Return Air System Static Pressure	Air Volume Exhausted
in. w.g.	cfm	in. w.g.	cfm
0.05	4085	0	10,200
0.10	3685	0.05	9700
0.15	3280	0.10	9200
0.20	2880	0.15	8600
0.25	2475	0.20	8100
---	---	0.25	7600
---	---	0.30	6900
---	---	0.35	6000
---	---	0.40	5000
---	---	0.45	4150

TABLE 10**SG/SC 120H Power Exhaust Fans Standard Static Performance**

Return Air System Static Pressure in. wg.	Air Volume Exhausted cfm
0.05	4085
0.10	3685
0.15	3280
0.20	2880
0.25	2475

TABLE 11**SG/SC 240 Power Exhaust Fans Standard Static Performance**

Return Air System Static Pressure in. wg.	Air Volume Exhausted - 240 cfm
0.00	10,200
0.05	9700
0.10	9200
0.15	8600
0.20	8100
0.25	7600
0.30	6900
0.35	6000
0.40	5000
0.45	4150
0.50	---

TABLE 12**Factory Installed Drive Kit Specifications**

Model No.	Nominal hp	Maximum hp	Drive Kit Number	RPM Range
120	3	3.45	#3 (staged)	660 - 900
			#4 (staged)	865 - 1080
240	5	5.75	#4 (staged)	520 - 685
	7.5	8.63	#5 (staged)	685 - 865
			#7 (staged)	770 - 965

TABLE 13**SG/SC 120 Manufacturer's Numbers**

Drive No.	DRIVE COMPONENTS					
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS	
	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
3 (MSAV)	1VP40 X 7/8	79J0301	BK77 X 1	49K4001	BX57	78L5301
4 (MSAV)	1VP50 X 7/8	P-8-2187	BK80 X 1	53J9301	BX59	59A5001

TABLE 14**SG/SC 240 Manufacturer's Numbers**

Drive No.	DRIVE COMPONENTS							
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS		SPLIT BUSHING	
	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
4 (MSAV)	1VP44 X 1-1/8	100239-07	BK110H	100788-06	BX68	88K3401	H-1-3/16	105616-02
5 (MSAV)	1VP50 X 1-1/8	P-8-1977	BK100H	100788-05	BX67	100245-09	H-1-3/16	105616-02
7 (MSAV)	1VP60 X 1-3/8	78L5501	BK110H	100788-06	BX71	31K9701	H-1-3/16	105616-02

Cooling Start-Up

WARNING



Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

IMPORTANT—The crankcase heater must be energized for 24 hours before attempting to start compressor. Set thermostat so there is no demand to prevent compressors from cycling. Apply power to unit.

MSAV™ Units and Units Equipped With Voltage or Phase Detection - The Unit Controller checks the incoming power during start-up. If the voltage or phase is incorrect, the Unit Controller will display an alarm and the unit will not start.

A-Preliminary Checks

- 1- Make sure that unit is installed in accordance with the installation instructions and applicable codes.
- 2- Inspect all electrical wiring, both field- and factory-installed, for loose connections. Tighten as required.
- 3- Check to ensure that refrigerant lines do not rub against the cabinet or against other refrigerant lines.
- 4- Check voltage at disconnect switch. Voltage must be within range listed on nameplate. If not, consult power company and have voltage condition corrected before starting unit.
- 5- Make sure filters are in place before start-up.

B-Start-Up

- 1- Initiate first and second stage cooling demands according to instructions provided with thermostat. Refer to the Optional Supply Air VFD section on MSAV™ units.
- 2- SG/SC 036 & 060 Units—First-stage thermostat demand (Y1) will energize the compressor and blower on low speed along with the condenser fan. An increased cooling demand (Y2) will increase the blower and compressor to high speed. On units with an economizer, when outdoor air is acceptable, a first-stage demand (Y1) will energize the economizer. An increased demand (Y2) will energize the compressor and blower on low speed along with the condenser fan.

SG/SC 120 Units—First-stage thermostat demand will energize compressor 1. Second-stage thermostat demand will energize compressor 2. On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressor 1.

SG/SC 240 Units—First-stage thermostat demand will energize compressors 1 and 2. Second-stage thermostat demand will energize compressors 3 and 4. On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressors 1 and 2.

IMPORTANT

Three Phase Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequentially to ensure correct compressor and blower* rotation and operation. Compressor and blower are wired in phase at the factory. Power wires are color-coded as follows: line 1-red, line 2-yellow, line 3-blue.

1-Observe suction and discharge pressures and blower* rotation on unit start-up.

2-Suction pressure must drop, discharge pressure must rise and blower* rotation must match rotation marking.

If pressure differential is not observed or blower* rotation is not correct:

3-Disconnect all remote electrical power supplies.

4-Reverse any two field-installed wires connected to the line side of S48 disconnect or TB13 terminal strip. Do not reverse wires at blower contactor.

5-Make sure the connections are tight.

Discharge and suction pressures should operate at their normal start-up ranges.

*Supply air VFD motors should rotate in the correct direction; verify scroll compressor rotation separately. Contact technical support if the VFD blower is rotating incorrectly. The blower rotation will always be correct on MSAV™ units (120/240 units will always have VFD motors). Checking blower rotation is not a valid method of determining voltage phasing for incoming power.

3- SG/SC 120 units contain two refrigerant circuits and two stages of cooling. See figure 27.

4- SG/SC 240 units contain four refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuits 1 and 2 make up stage 1 cooling in thermostat mode. Evaporator and condenser refrigerant circuits 3 and 4 make up stage 2 cooling in thermostat mode. See figure 28.

- 5- Each refrigerant circuit is separately charged with R-410A refrigerant. See unit rating plate for correct amount of charge.
- 6- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

! IMPORTANT
 Mineral oils are not compatible with R410A. If oil must be added, it must be a polyol ester oil.

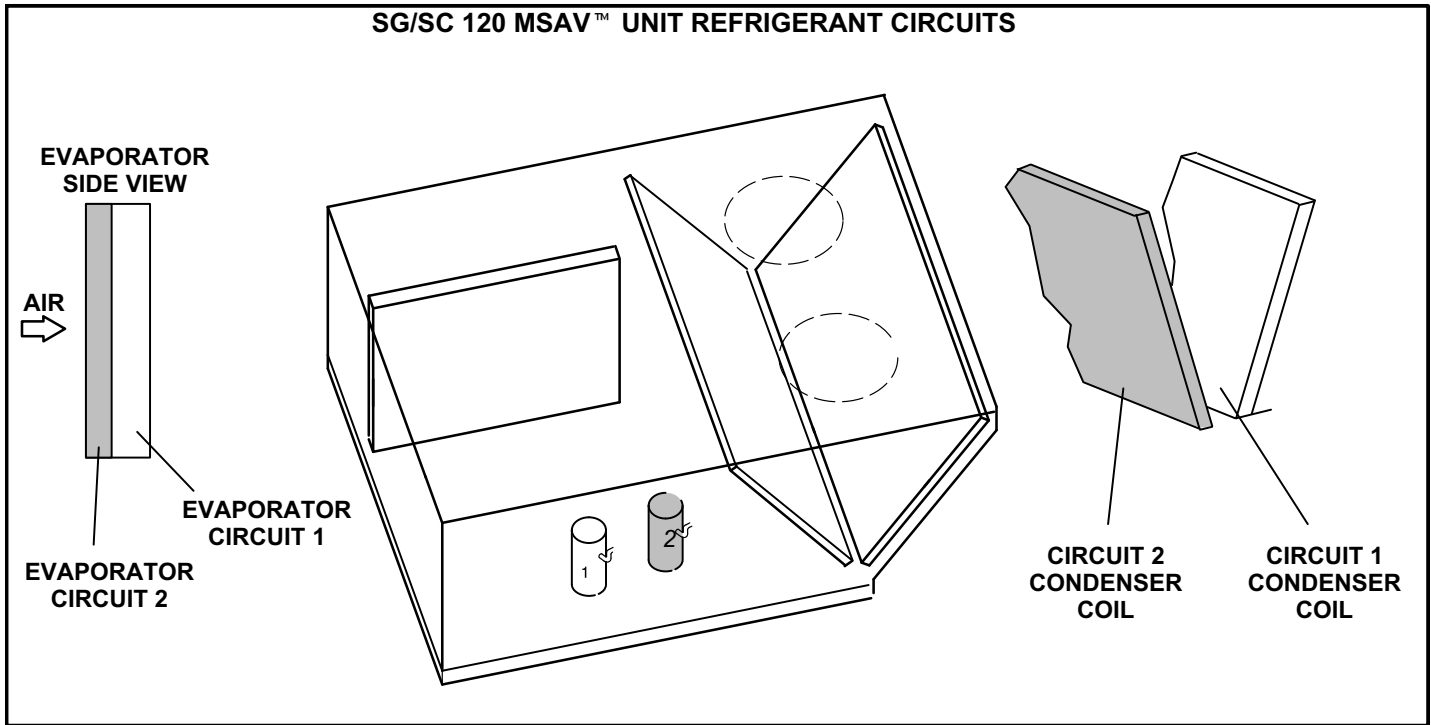


FIGURE 27

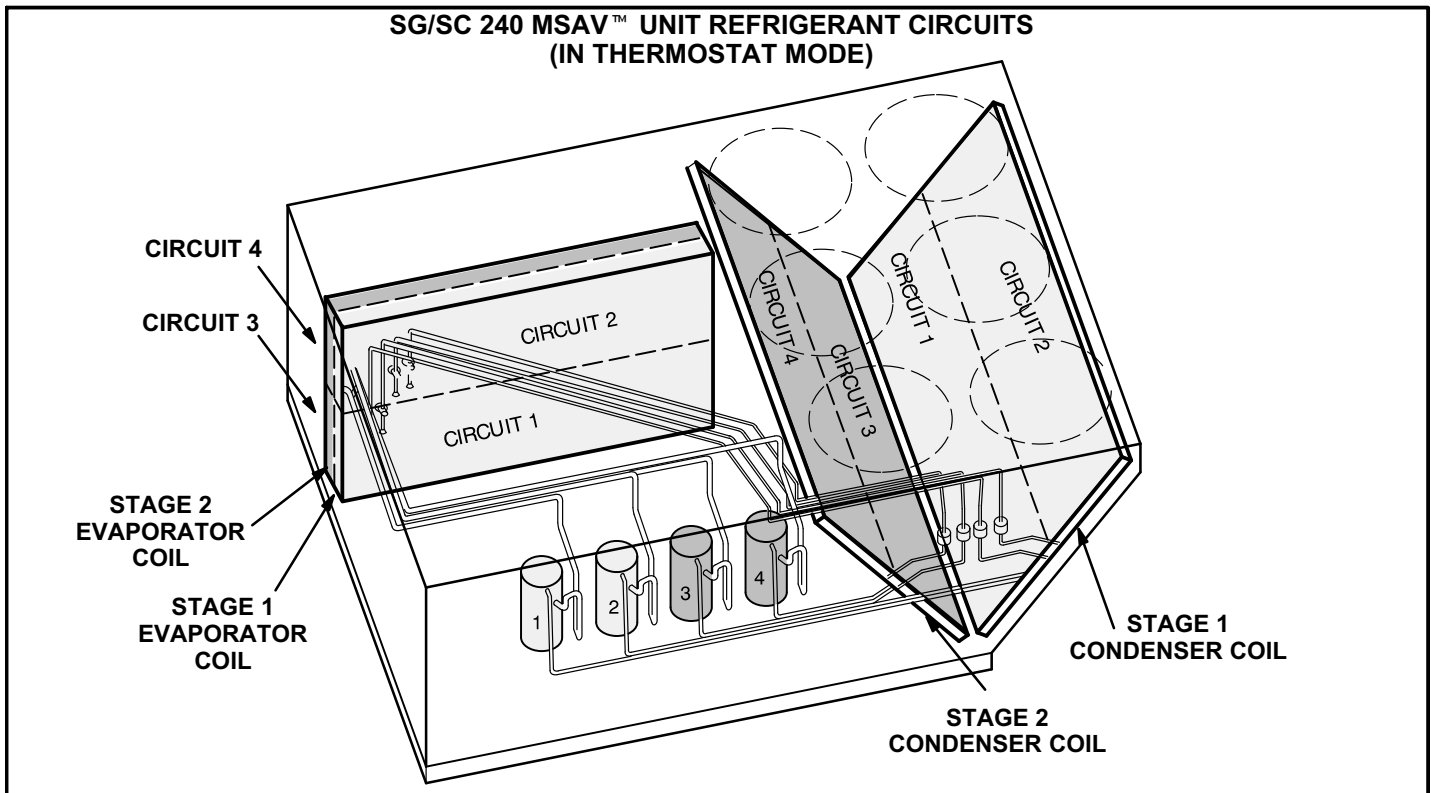


FIGURE 28

Cooling Operation and Adjustments

A-Refrigerant Charge and Check

⚠ WARNING

Do not exceed nameplate charge under any condition.

This unit is factory charged and should require no further adjustment. If the system requires additional refrigerant, reclaim the charge, evacuate the system, and add required nameplate charge.

*NOTE - System charging is not recommended below 60°F (15°C). In temperatures below 60°F (15°C), the charge **must** be weighed into the system.*

If weighing facilities are not available, or to check the charge, use the following procedure:

IMPORTANT - Charge unit in standard cooling mode.

- 1- Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.
- 2- Check each system separately with all stages operating. Compare the normal operating pressures (see tables 15 - 21) to the pressures obtained from the gauges. Check unit components if there are significant differences.

- 3- Measure the outdoor ambient temperature and the suction pressure. Refer to the appropriate circuit charging curve to determine a target liquid temperature.

Note - Pressures are listed for sea level applications.

- 4- Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).
 - If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
 - If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.
- 5- Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.
- 6- Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.
- 7- Example: SG/SC 240 Circuit 1: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 96°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

TABLE 15

SG/SC 036 Normal Operating Pressures - No Reheat - 580971-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
120	229	117	269	122	316	125	363	127	418	130	488
128	230	131	268	132	313	134	361	135	417	138	482
147	239	147	273	152	314	154	360	158	413	161	474
165	254	167	282	172	325	174	368	176	424	180	489

TABLE 16

SG/SC 036 Normal Operating Pressures - Reheat - 580979-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
113	246	114	293	113	363	115	439	119	534	125	561
121	249	125	276	124	352	125	423	129	475	133	540
136	264	143	288	147	324	148	380	151	440	152	514
154	278	160	307	168	339	171	382	174	439	176	507

TABLE 17

SG/SC 060 Normal Operating Pressures - No Reheat - 580972-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
109	229	112	267	112	313	115	362	117	437	120	536
118	232	119	269	122	312	124	364	124	430	129	513
133	240	136	275	141	316	142	364	143	422	147	489
148	253	152	286	160	325	162	371	164	424	168	484

TABLE 18

SG/SC 060 Normal Operating Pressures - Reheat - 580980-01											
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
107	250	110	285	111	335	114	393	117	470	120	562
114	254	118	287	120	333	123	388	125	452	128	535
129	270	135	298	139	339	142	385	145	444	148	511
146	284	152	313	158	348	162	395	166	449	169	510

TABLE 19

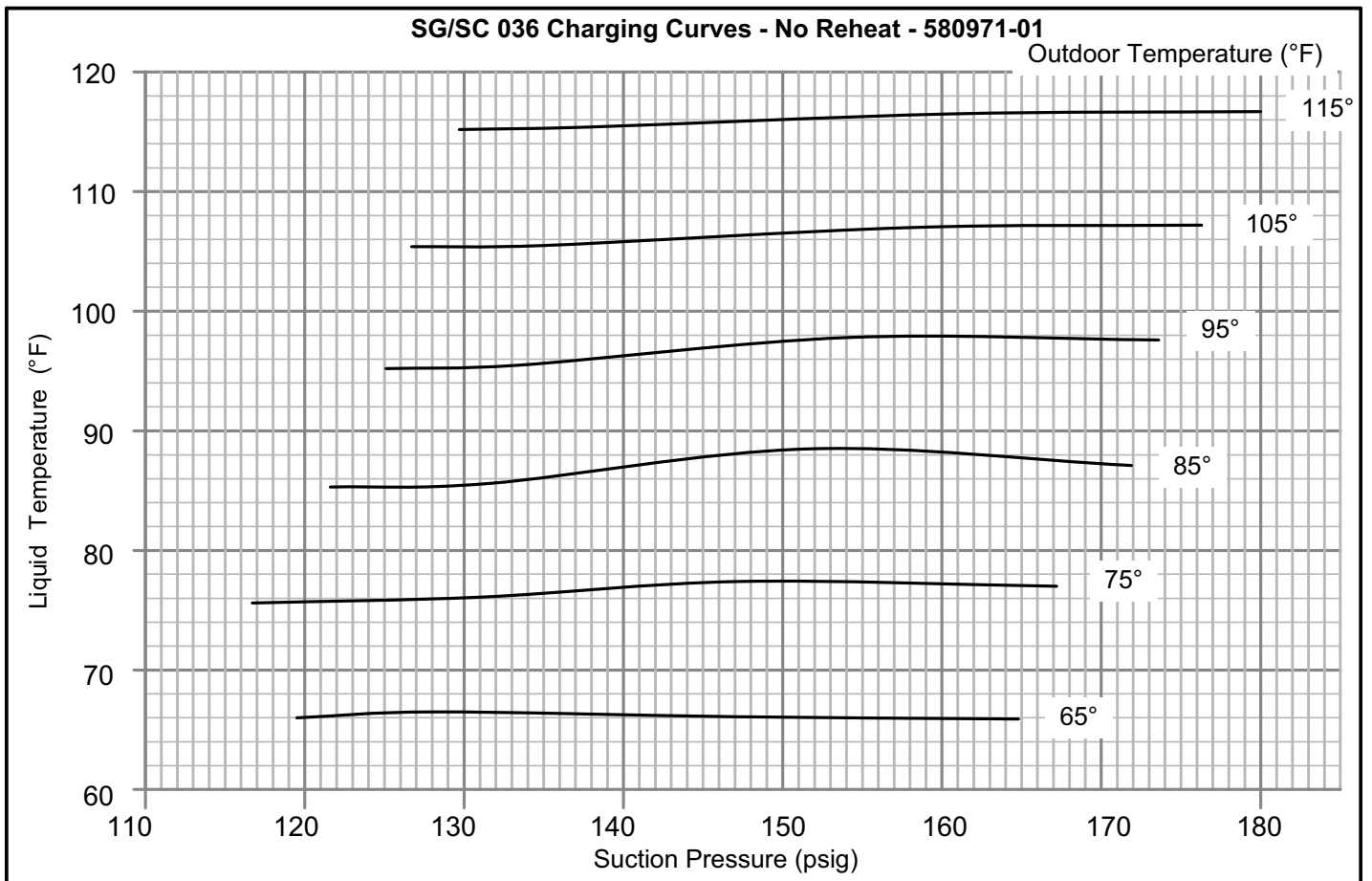
SG/SC 120 Normal Operating Pressures - No Reheat & Reheat - 580740-02												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	109	241	112	273	116	312	118	355	121	403	124	457
	118	244	120	280	122	321	126	364	129	411	132	465
	136	252	140	286	142	326	144	375	147	428	150	483
	152	278	157	303	162	338	166	381	169	430	172	486
Circuit 2	110	250	112	286	116	329	117	374	120	423	123	479
	119	254	120	293	123	334	125	380	128	429	132	487
	136	262	138	301	141	344	143	392	146	447	149	510
	151	272	157	312	161	355	164	403	166	455	170	515

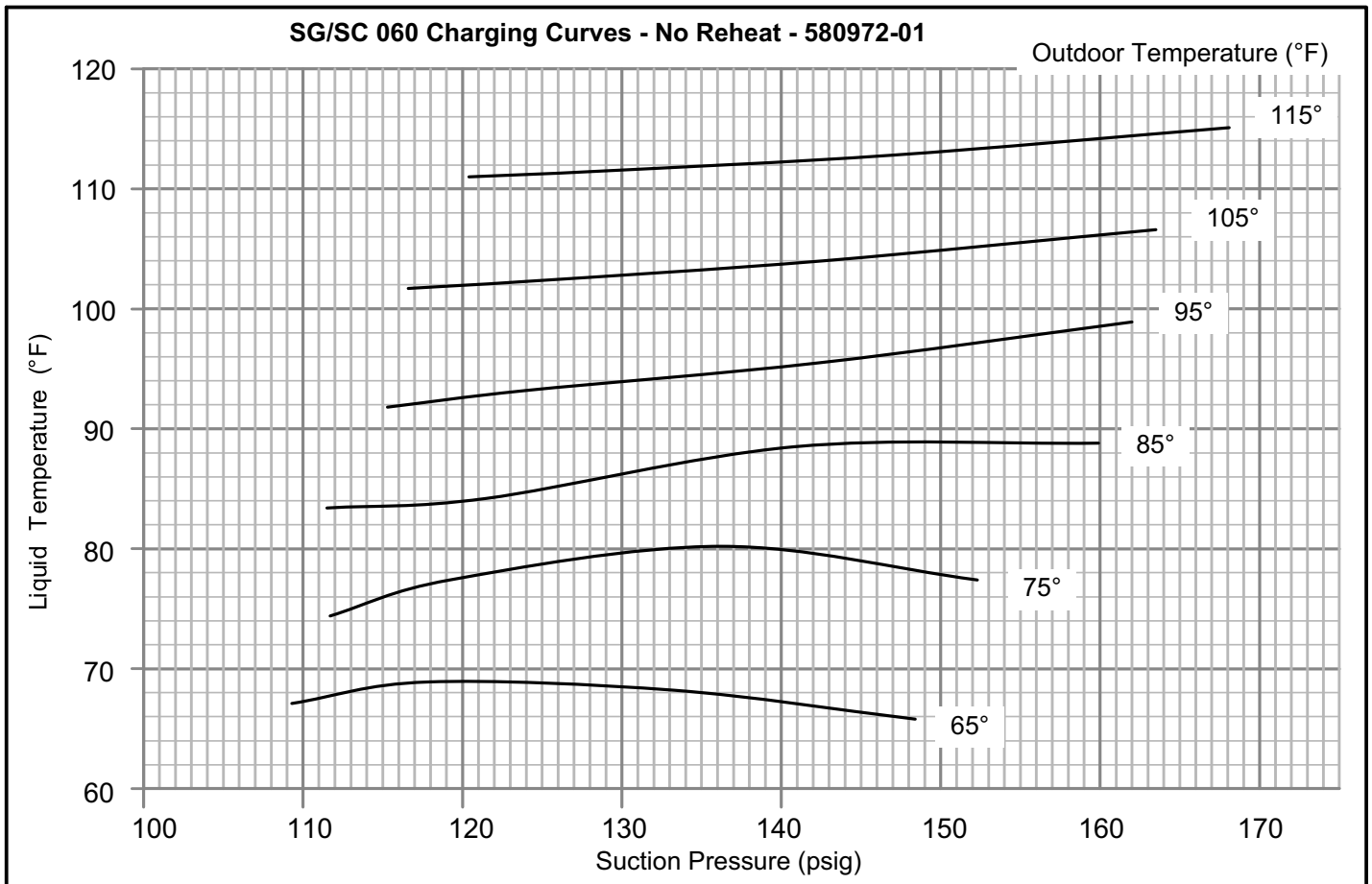
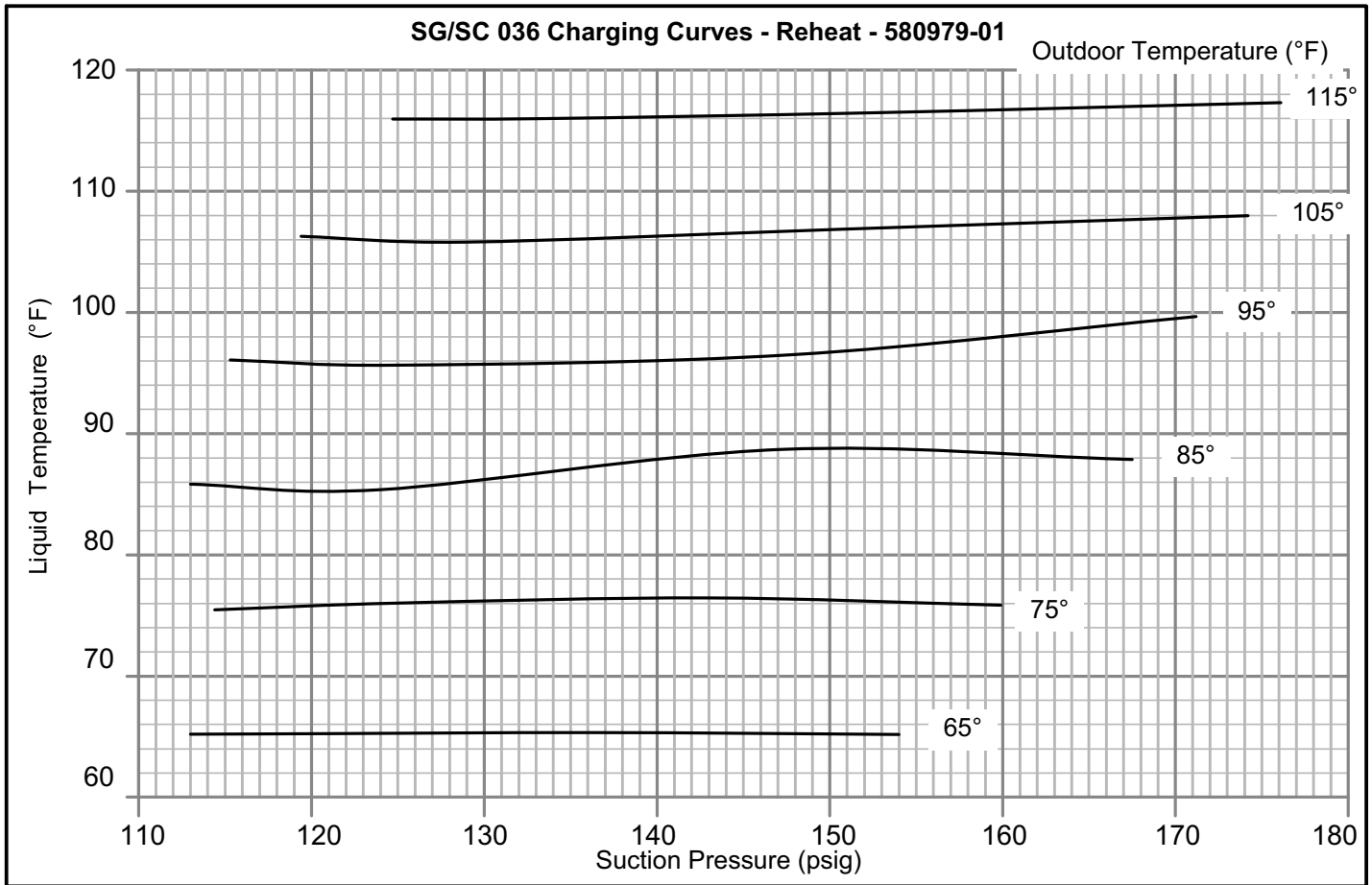
TABLE 20

SG/SC 240 Normal Operating Pressures - No Reheat - 580975-01												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	101	236	103	275	105	322	106	375	108	441	110	527
	109	238	112	277	114	324	115	376	117	438	119	518
	126	242	129	280	132	328	134	379	136	432	138	502
	145	252	150	293	152	332	155	388	158	440	160	508
Circuit 2	109	232	112	268	113	313	114	362	116	419	117	497
	118	233	121	271	123	314	123	363	125	415	127	485
	135	238	138	274	141	319	144	365	146	417	147	482
	153	249	158	289	161	325	164	374	168	424	171	487
Circuit 3	109	238	111	278	113	320	115	372	117	422	119	484
	117	241	120	278	122	325	124	375	126	427	129	490
	134	248	137	282	140	332	143	381	145	431	148	494
	151	255	157	296	160	336	164	393	167	443	171	507
Circuit 4	109	235	111	274	113	316	115	374	116	414	117	500
	118	239	120	275	122	322	124	375	125	417	128	497
	136	246	138	276	140	325	143	376	146	426	148	498
	154	253	160	291	161	326	164	386	167	432	171	501

TABLE 21

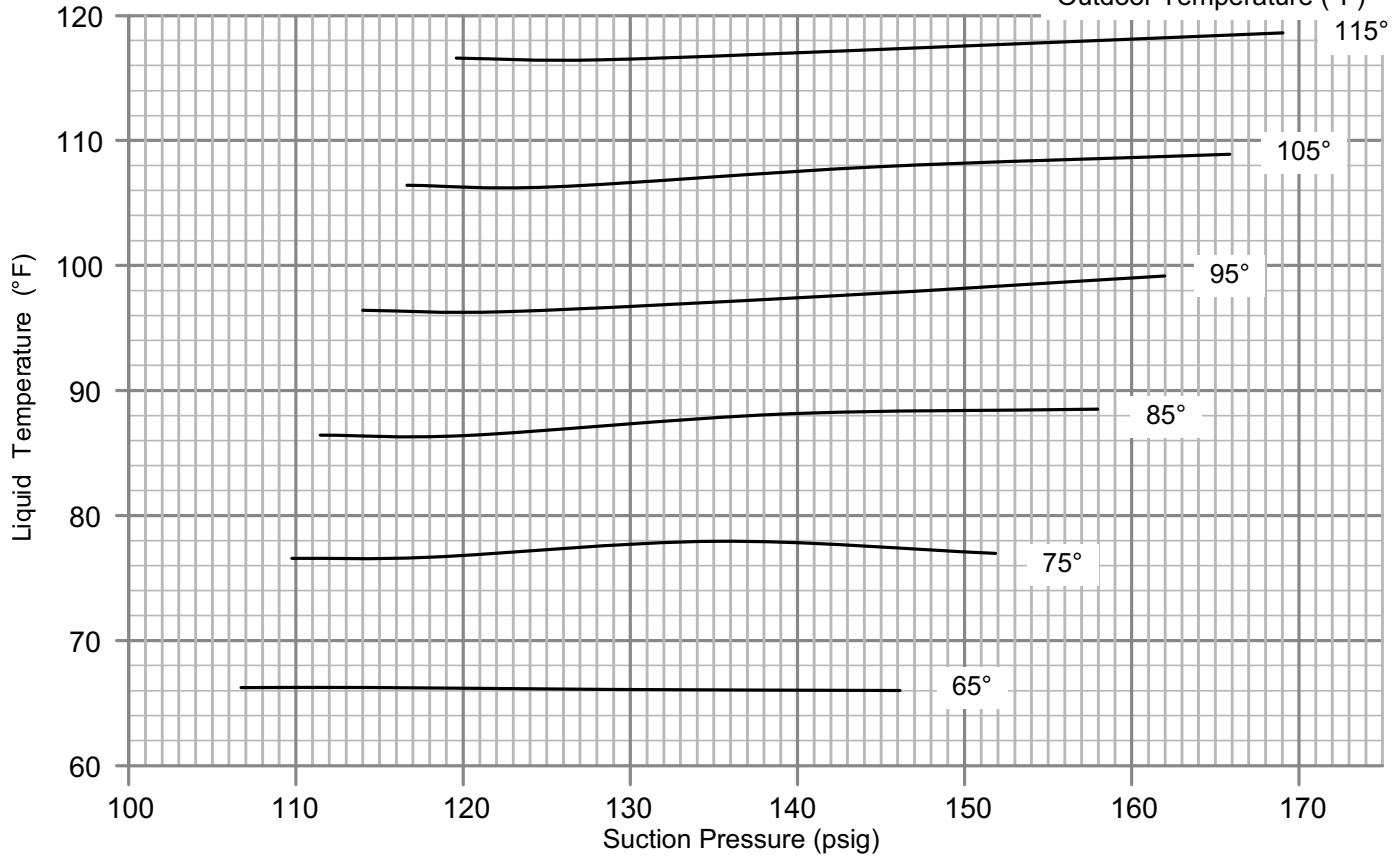
SG/SC 240 Normal Operating Pressures - Reheat - 580977-01												
	Outdoor Coil Entering Air Temperature											
	65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
Circuit 1	100	239	101	275	104	324	107	371	109	422	112	491
	109	244	111	278	113	327	115	376	117	428	120	489
	127	251	129	287	131	333	134	379	136	436	139	497
	146	266	149	297	153	340	155	389	158	443	161	505
Circuit 2	107	240	109	276	112	323	114	372	117	419	119	487
	117	245	119	280	120	326	123	373	126	428	129	484
	135	253	137	286	140	329	142	375	146	432	149	494
	151	267	157	296	162	340	165	382	168	434	172	497
Circuit 3	104	236	104	273	107	323	109	371	111	424	114	491
	113	240	114	275	115	325	117	378	120	432	122	492
	131	248	132	282	134	332	135	383	139	438	142	502
	148	257	153	288	157	336	158	391	161	444	164	512
Circuit 4	110	238	110	272	112	320	114	370	117	429	120	503
	118	243	119	275	121	324	123	378	126	437	129	501
	137	247	138	280	140	328	144	380	145	440	148	505
	155	252	159	285	162	332	165	391	167	444	171	513

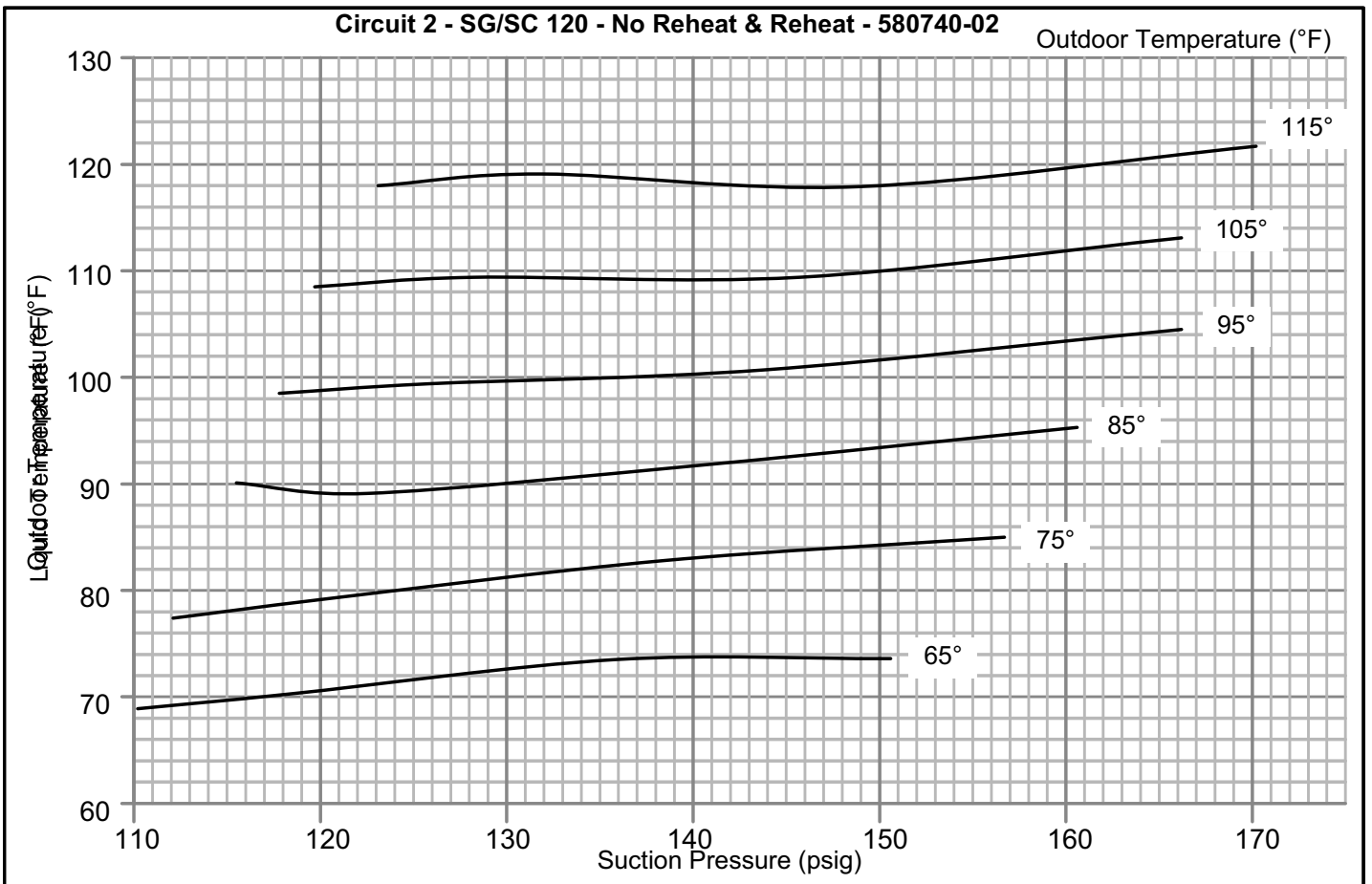
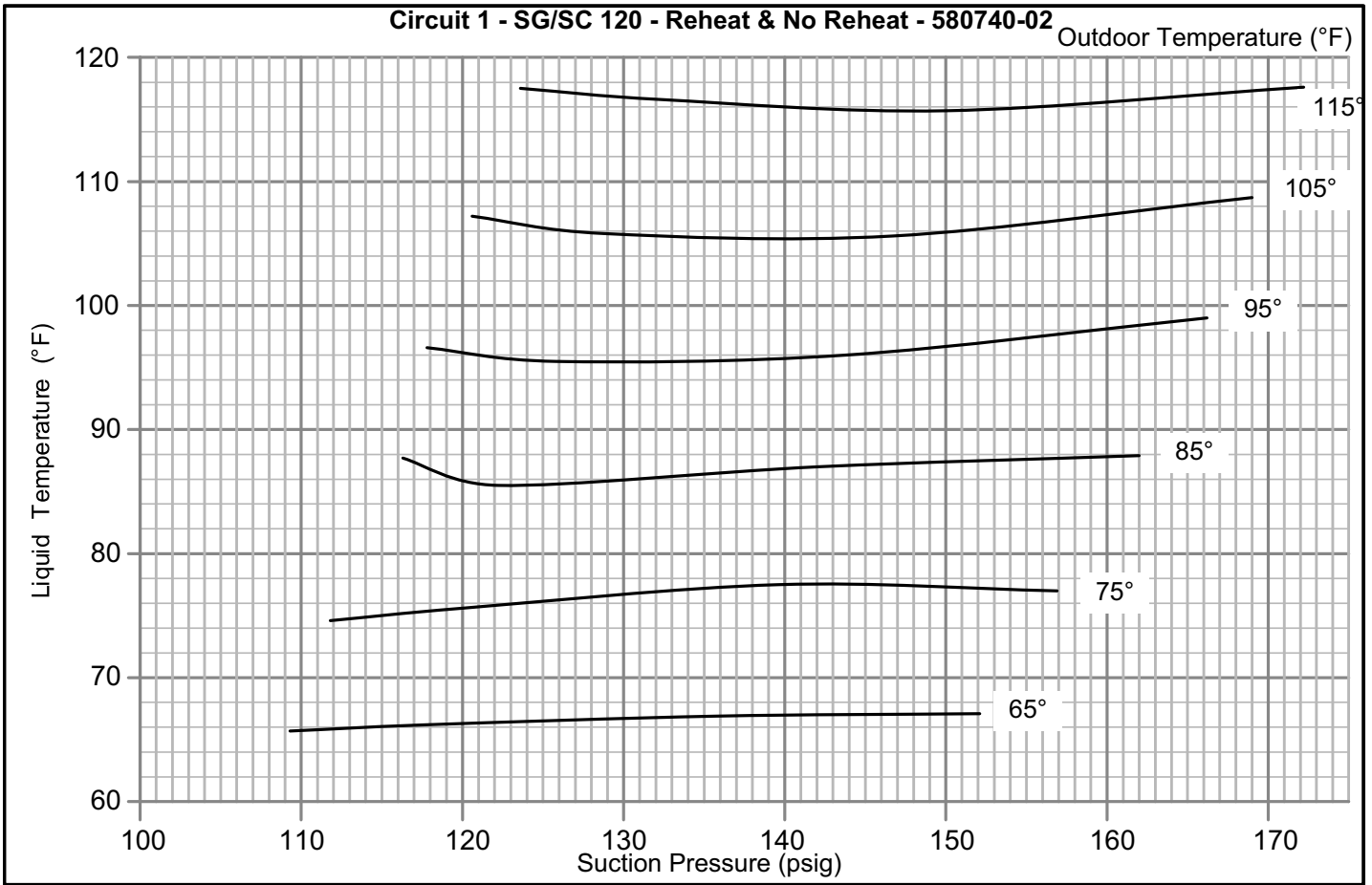




SG/SC 060 Charging Curves - Reheat - 580980-01

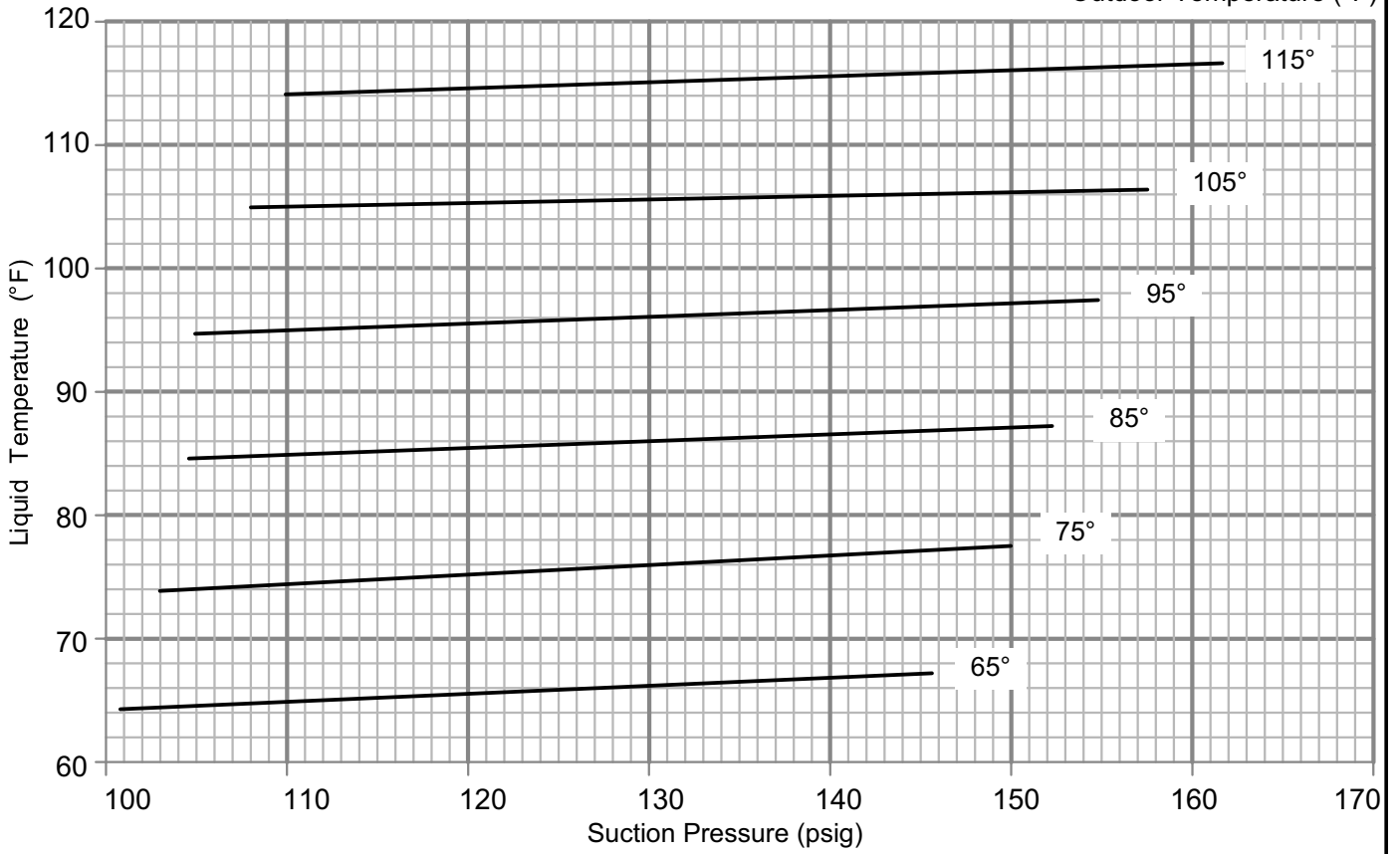
Outdoor Temperature (°F)





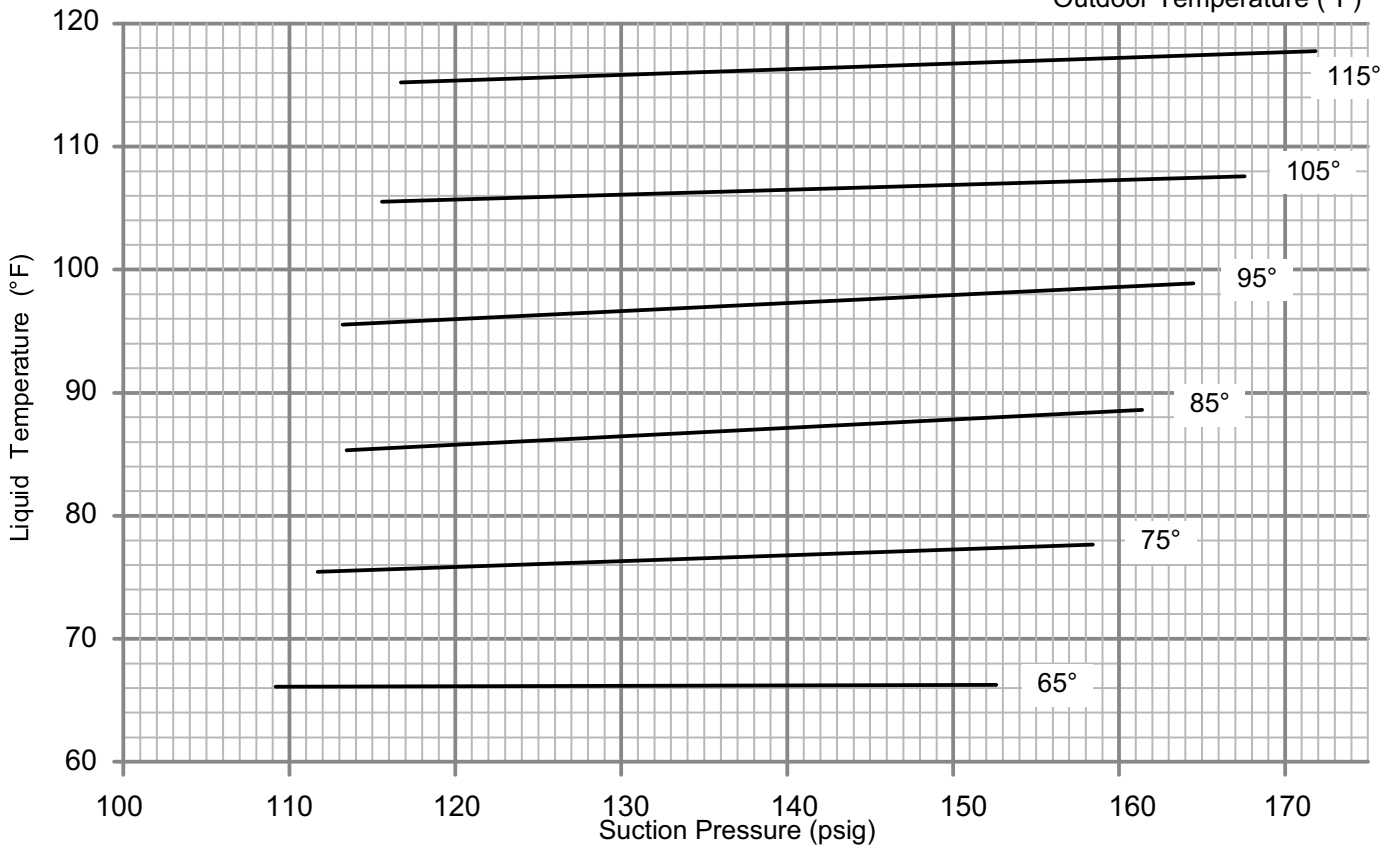
Circuit 1 - SG/SC 240 - No Reheat - 580974-01

Outdoor Temperature (°F)

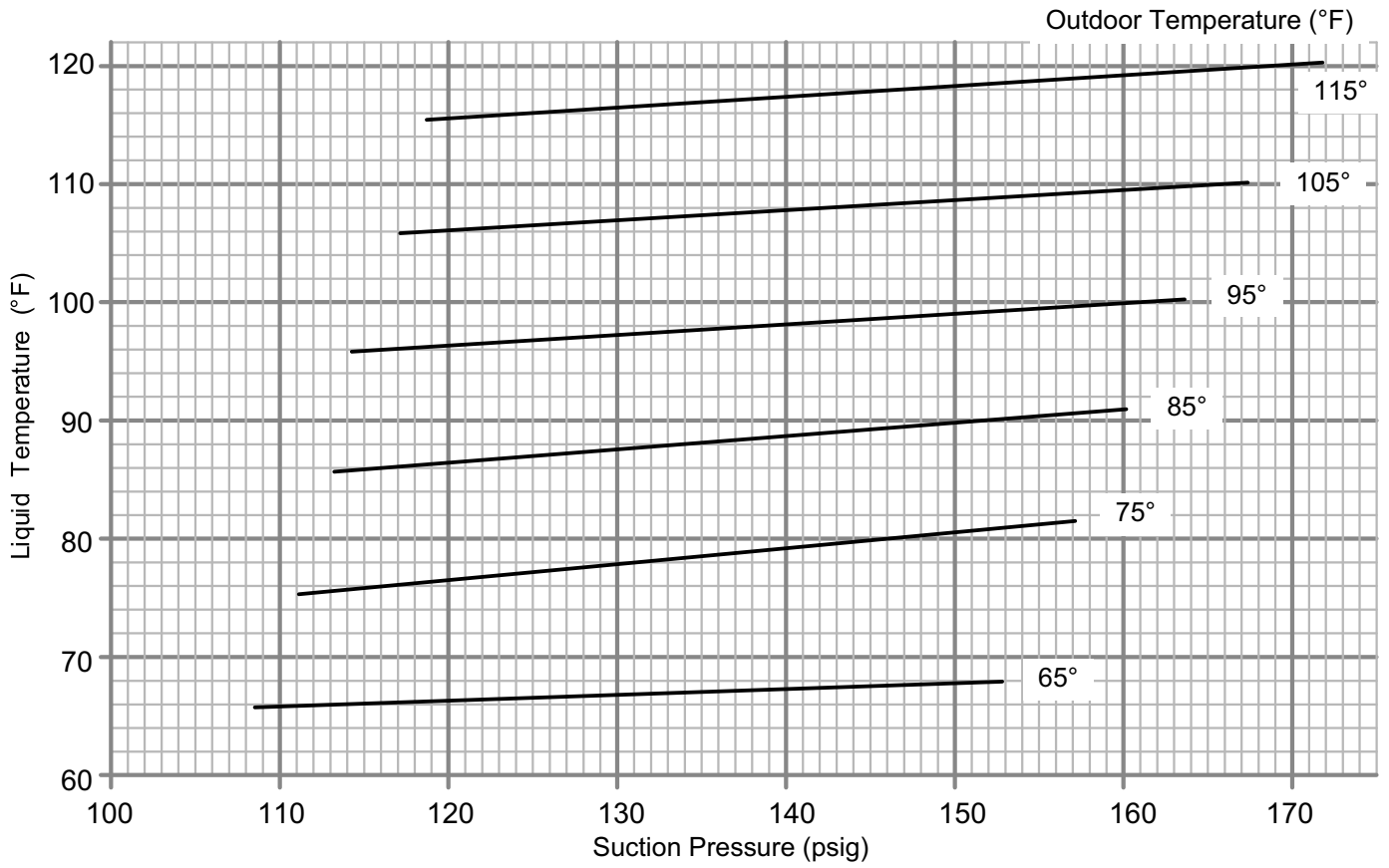


Circuit 2 - SG/SC 240 - No Reheat - 580974-01

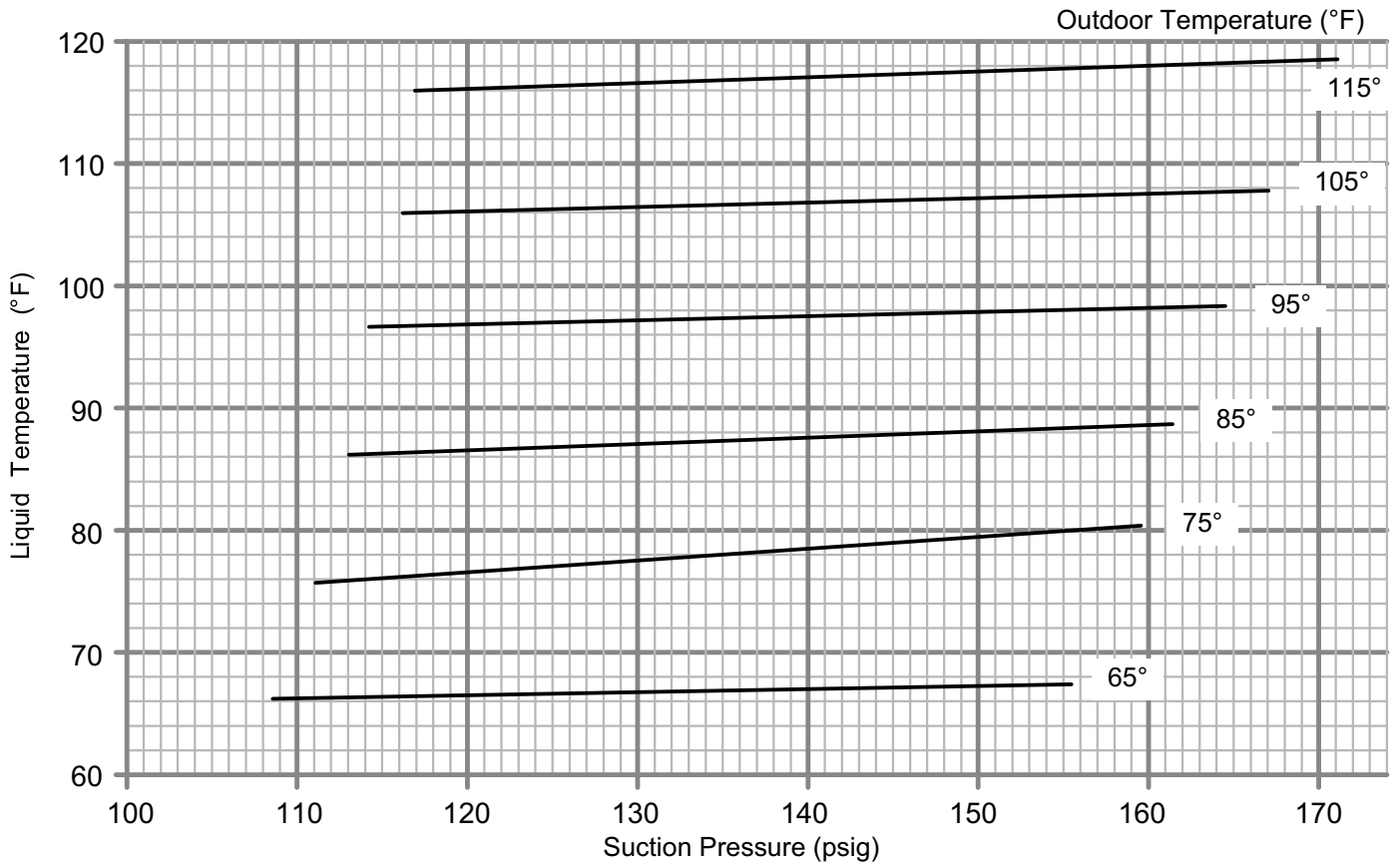
Outdoor Temperature (°F)



Circuit 3 - SG/SC 240 - No Reheat - 580974-01

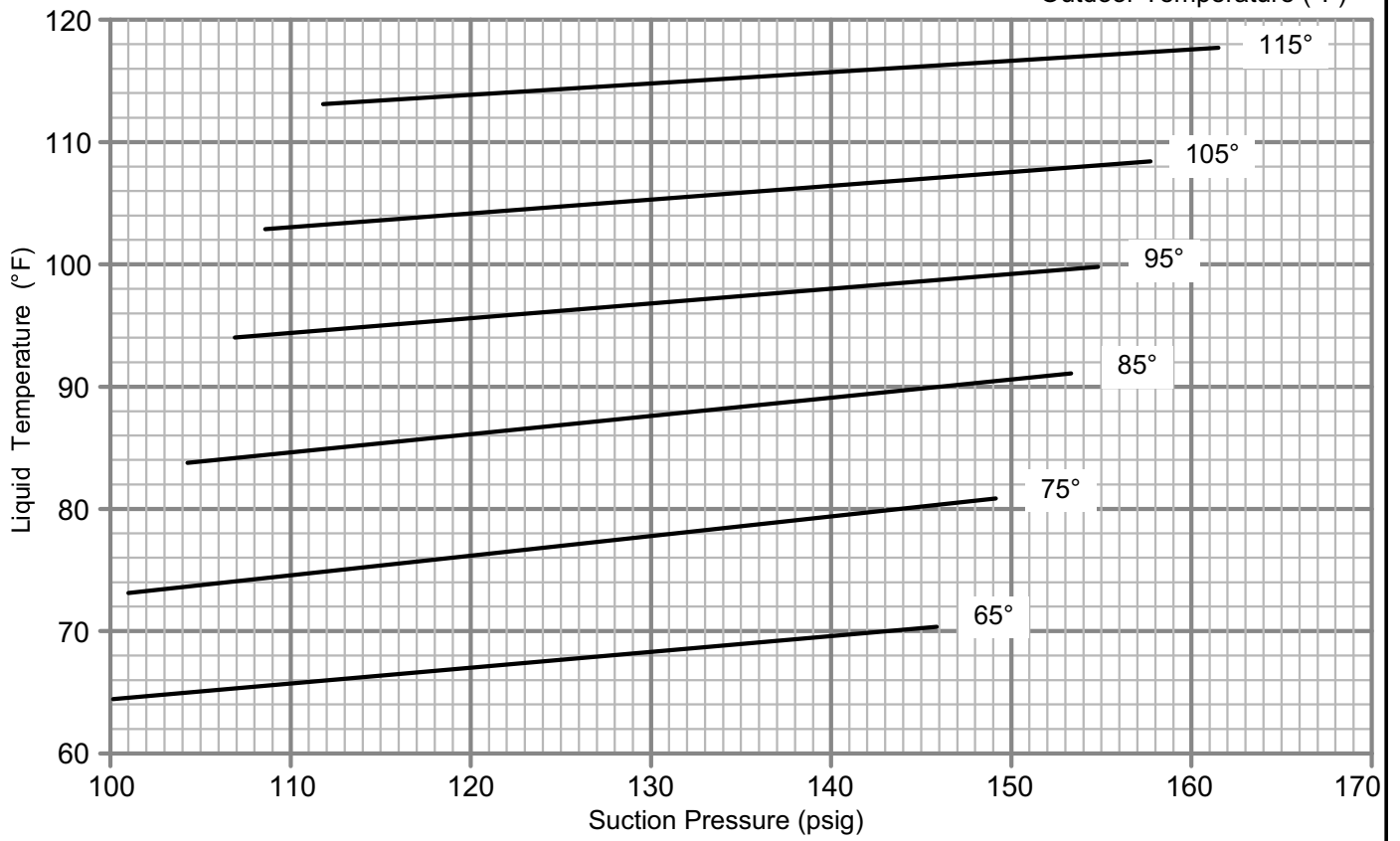


Circuit 4 - SG/SC 240 - No Reheat - 580974-01



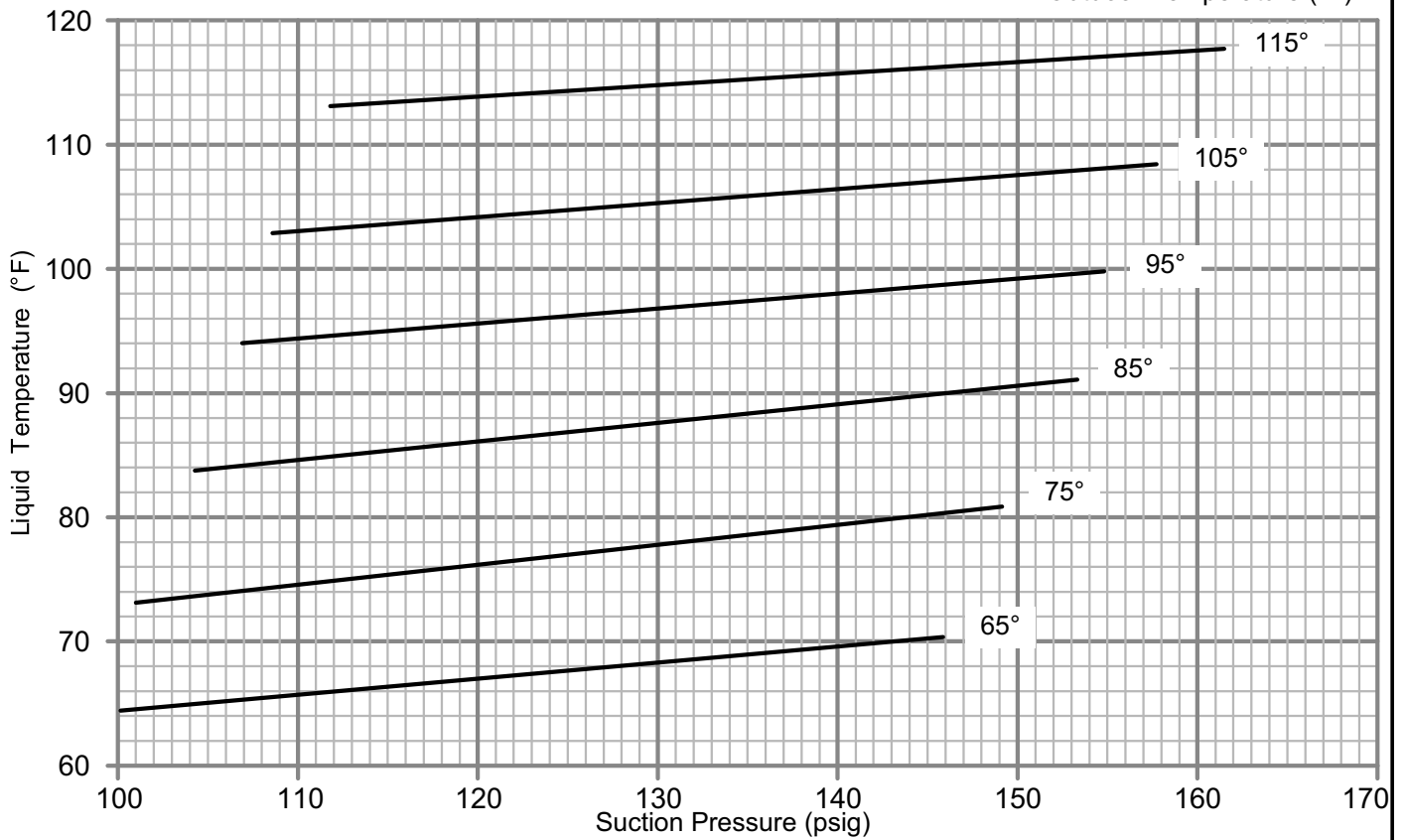
Circuit 1 - SG/SC 240 - Reheat - 580976-01

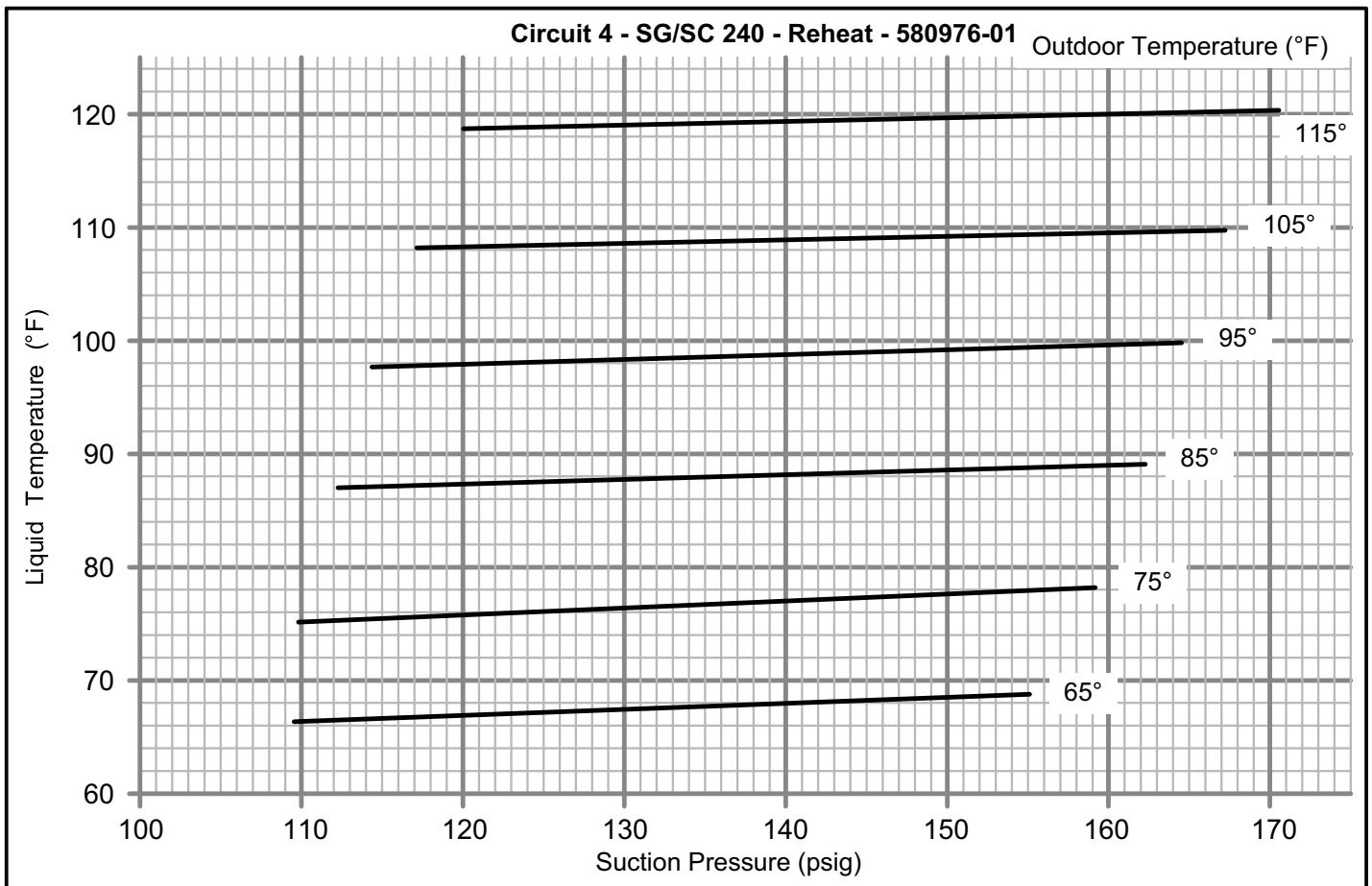
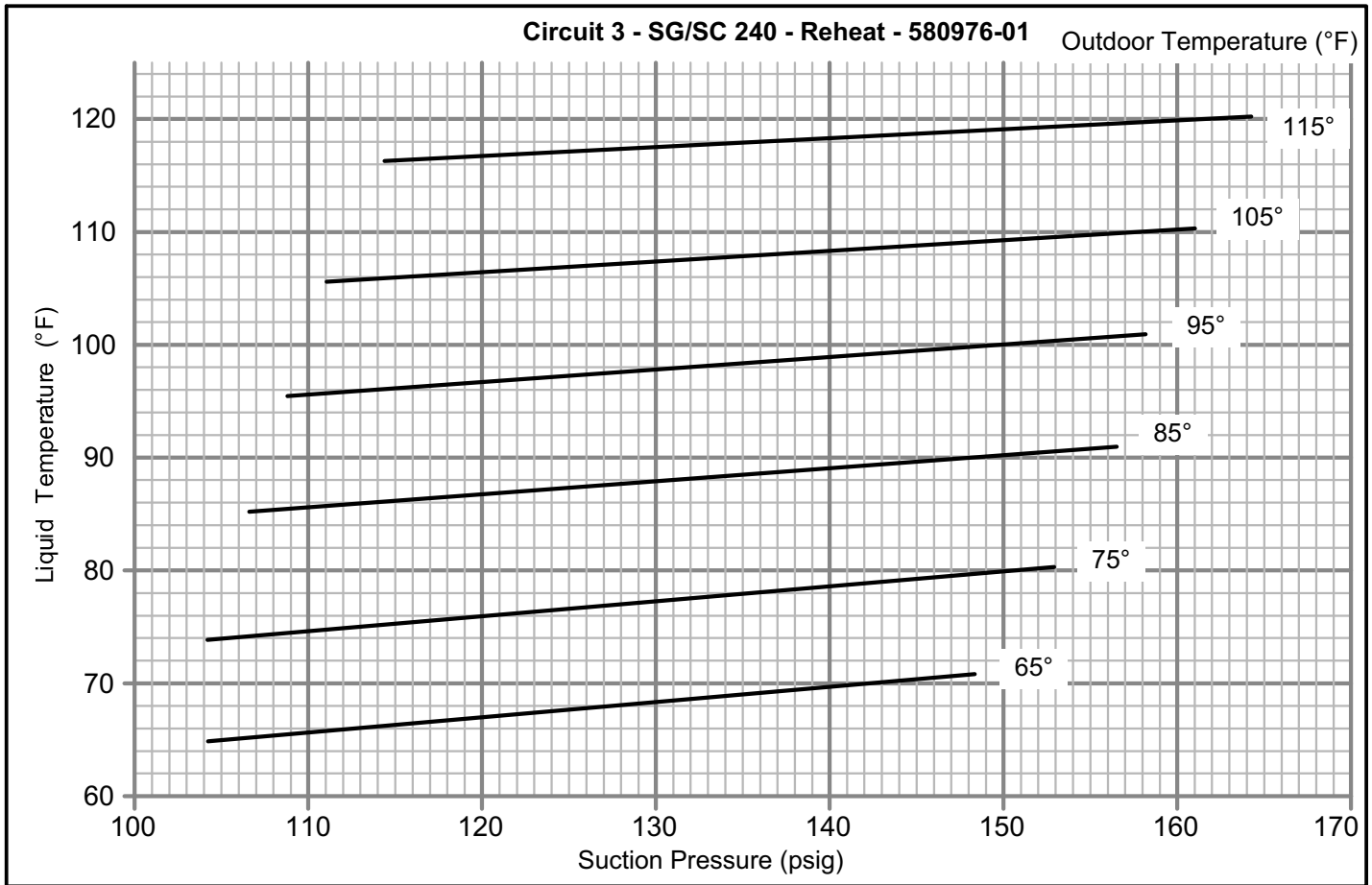
Outdoor Temperature (°F)



Circuit 2 - SG/SC 240 - Reheat - 580976-01

Outdoor Temperature (°F)





B-Compressor Controls

- 1- Crankcase Heater (HR1, HR2, HR5, HR11)
The compressor contains a belly band compressor oil heater which must be on 24 hours before running compressors. Energize by setting thermostat so that there is no cooling demand, to prevent compressor from cycling and apply power to unit.
- 2- Low Ambient Pr. Switch (S11, S84, S85, S94)
Switches are installed in the liquid line. Switches maintain adequate discharge pressure by de-energizing condenser fan(s) when liquid pressure falls below 240 psig ± 10 (1655 kPa ± 69). Switches close to energize condenser fan(s) when pressure rises to 450 psig ± 10 (3103kPa ± 69).
- 3- Outdoor Fan Relays (K10, K68, K149, K150, K152, K153)
Relays de-energize outdoor fan when temperature drops below 55°F.
Low Ambient Cycling (see figure 29):
3 & 5 Ton Units—S11 cycles both variable speed fans between off and extra low (25% of full speed).
10 Ton Units—Both condenser fans are energized on a Y1 cooling demand and continue to operate when Y2 demand is initiated. The M3 (A55) Unit Controller de-energizes condenser fan 1 when the outdoor temperature drops below 55°F (13°C). Condenser fan 2 is cycled by S11 and S84 pressure switches (via K68). Normal operation will resume above 58°F (15°C).
20 Ton Units—Condenser fans 1, 2 and 3 are energized on a Y1 cooling demand. An increased Y2 demand will energize condenser fans 4, 5 and 6. Condenser fan 1 and 6 are de-energized below 40°F (4.4°C) by M2 (A55) controller and C2 A59 controllers respectively. Condenser fans 2 and 5 are de-energized below 55°F (13°C) by A55 Unit Controller and C2 (A178) Compressor 3 & 4 Controller respectively. Condenser fan 3 is de-energized when **BOTH** S11 and S84 open due to low pressure. Condenser fan 4 is de-energized when **BOTH** S85 and S94 open due to low pressure.
- 4- Freezestats (S49, S50, S53, S95)
Switches de-energize compressors when evaporator coil temperature falls below 29°F (-2°C) to prevent evaporator freeze-up. Switches reset when evaporator coil temperature reaches 58°F (15°C).
- 5- Crankcase Heater Thermostat (S40, S162)
Switches de-energize crankcase heaters when discharge temperature rises above 94°F ± 5 (34.4°C ± 5). Switch opens to energize crankcase heaters when discharge temperature drops below 74°F+5 (23.2°C ± 5).

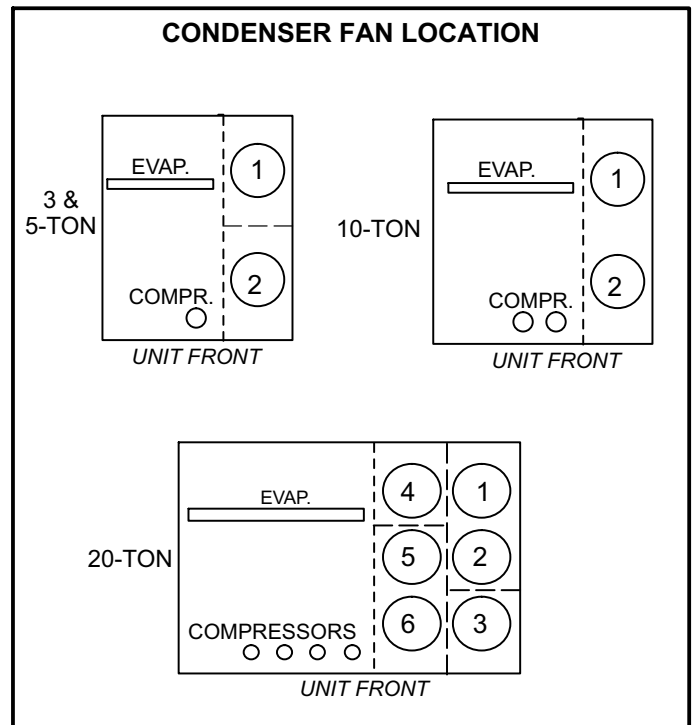


FIGURE 29

Gas Heat Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

BEFORE LIGHTING smell all around the furnace area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

Use only your hand to move the gas valve lever. Never use tools. If the lever will not move, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

This unit is equipped with an automatic spark ignition system. There is no pilot. In case of a safety shutdown, move thermostat switch to **OFF** and return the thermostat switch to **HEAT** to reset ignition control.

⚠ WARNING



Electric shock hazard.

Can cause injury or death.

Before attempting to perform any service or maintenance, turn the electrical power to unit **OFF** at disconnect switch(es). Unit may have multiple power supplies.

⚠ WARNING



Danger of explosion.

Can cause injury or death.

Do not attempt to light manually. Unit has a direct spark ignition system.

⚠️ WARNING

SMOKE POTENTIAL

The heat exchanger in this unit could be a source of smoke on initial firing. Take precautions with respect to building occupants and property. Vent initial supply air outside when possible.

⚠️ WARNING



Electric shock hazard. Can cause injury or death. Do not use this unit if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the control system and any gas control which has been under water.

⚠️ WARNING



Danger of explosion.

Can cause injury or product or property damage. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

A-Placing Unit In Operation

⚠️ WARNING



Danger of explosion and fire.

Can cause injury or product or property damage.

You must follow these instructions exactly.

Gas Valve Operation (figure 30 and 31)

- 1- Set thermostat to lowest setting.
- 2- Turn off all electrical power to furnace.
- 3- This furnace is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.
- 4- Open or remove the heat section access panel.
- 5- Move the gas valve lever to **OFF**. Do not force.
- 6- Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas, go to the next step.
- 7- Move the gas valve lever to **ON**. Do not force.
- 8- Close or replace the heat section access panel.

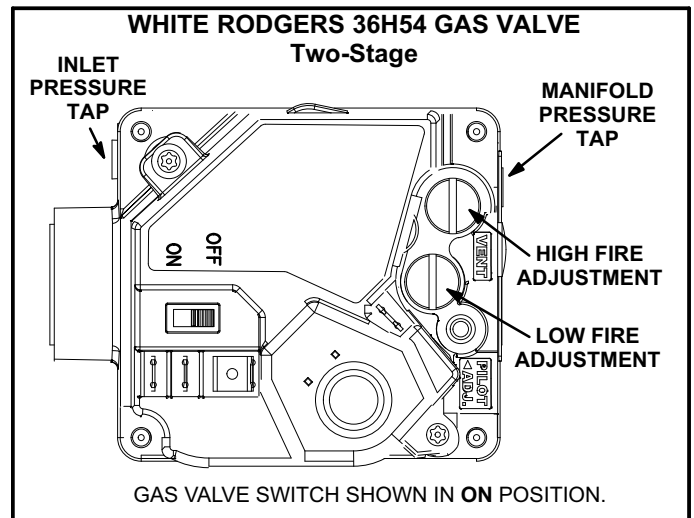


FIGURE 30

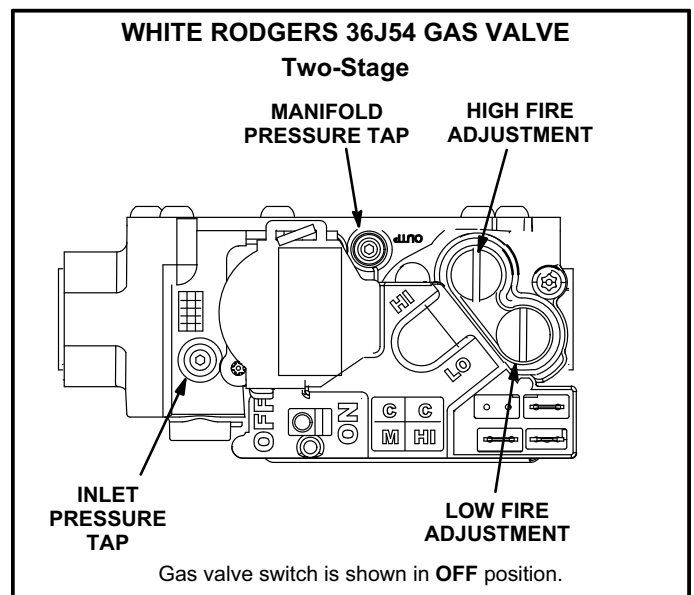


FIGURE 31

- 9- Turn on all electrical power to furnace.
- 10- Set thermostat to desired setting.
- 11- The ignition sequence will start.
- 12- If the furnace does not light the first time (gas line not fully purged), it will attempt up to two more ignitions before locking out.
- 13- If lockout occurs, repeat steps 1 through 10.
- 14- If the furnace will not operate, follow the instructions "Turning Off Gas to Furnace" and call your service technician or gas supplier.

Turning Off Gas to Furnace

- 1- If using an electromechanical thermostat, set to the lowest setting.
- 2- Before performing any service, turn off all electrical power to the furnace.
- 3- Open or remove the heat section access panel.
- 4- Move the gas valve lever to **OFF**. Do not force.
- 5- Replace heat section access panel.

Electric Heat Start-Up

Electric heat will stage on and cycle with thermostat demand. Number of stages of electric heat will vary depending on electric heat assembly. See electric heat wiring diagram on unit for sequence of operation.

Heating Operation and Adjustments

(SG Units)

A-Heating Sequence of Operation

- 1- On a heating demand the combustion air inducer starts immediately.
- 2- Combustion air pressure switch proves inducer operation. After a 30-second pre-purge, power is allowed to ignition control. Switch is factory set and requires no adjustment.
- 3- Spark ignitor energizes and gas valve solenoid opens.
- 4- Spark ignites gas, ignition sensor proves the flame and combustion continues.
- 5- If flame is not detected after 8 seconds, the ignition control will repeat steps 3 and 4 two more times. The ignition control will wait 5 minutes before the ignition attempt recycles.
- 6- For troubleshooting purposes, an ignition attempt after lock out may be re-established manually. Move thermostat to "OFF" and return thermostat switch to "HEAT" position.

Primary Limit Location

Limit controls are factory-set and are not adjustable.

SG 036 & 060 - On the vestibule to the right of the combustion air inducer. See figure 32.

SG 120 - Upper right corner of blower support wall.

SG 240 - See figure 33.

Secondary Limit Location

(none on 3, 5, 20-ton units)

SG 120 - Top back side of blower housing.

B-Heating Adjustment

Main burners are factory-set and do not require adjustment.

C-Two-Stage Gas Manifold Pressure Adjustment

IMPORTANT - Do not set low fire pressure lower than the certified minimum input rating listed in table 22.

Gas manifold pressures should match pressures shown in table 22. On two stage gas valves, initiate a W2 thermostat demand to check high fire pressure before low fire pressure. With high fire operating, reduce the thermostat demand to W1 and check the low fire pressure.

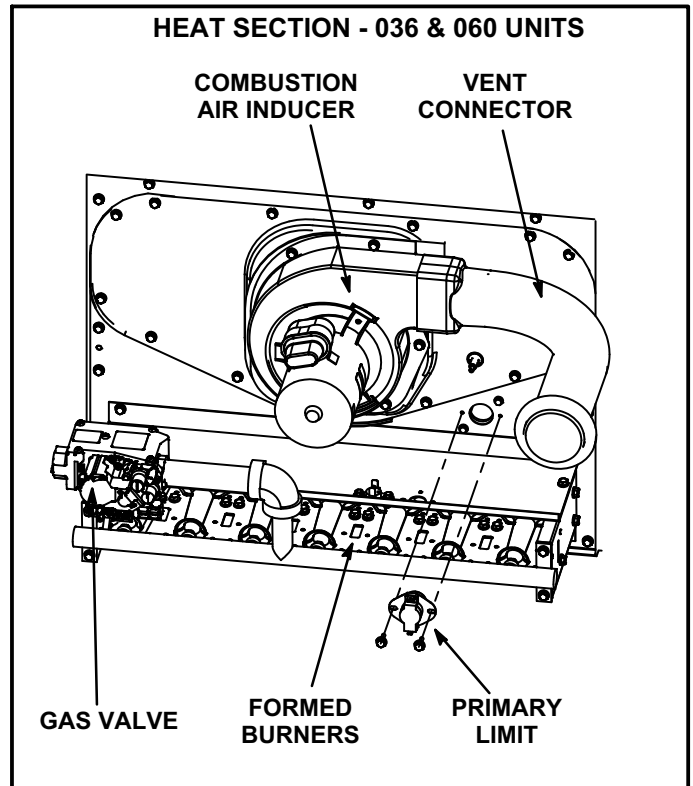


FIGURE 32

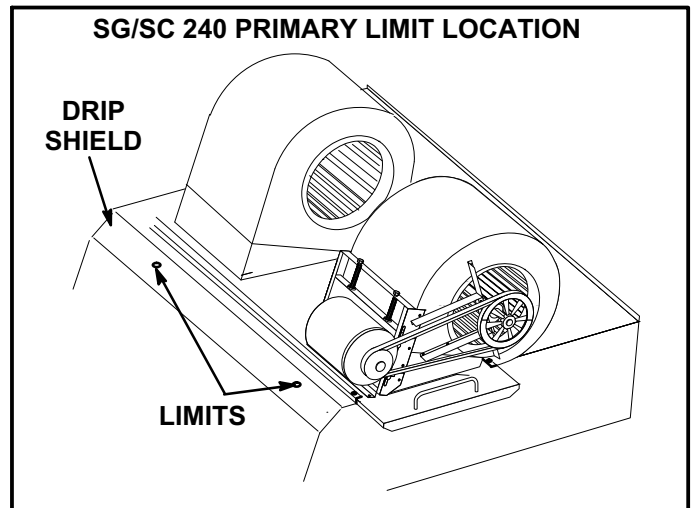


FIGURE 33

TABLE 22
Manifold Input Pressures - in.wg. (kPa)

Unit	Natural Gas		Propane (LP) Gas	
	1st Stage ± 0.2 (±.05)	2nd Stage ± 0.3 (±.08)	1st Stage ± 0.2 (±.05)	2nd Stage ± 0.3 (±.08)
036, 060	2.0 (0.50)	3.5 (0.87)	5.9 (1.47)	10.5 (2.61)
120, 240	1.6 (0.40)	3.7 (0.92)	5.5 (1.37)	10.5 (2.61)

D-Proper Gas Flow (Approximate)

- 1- Operate unit at least 15 minutes before checking gas flow. Determine the time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) A portable LP gas meter (17Y44) is available for LP applications.
- 2- **Divide the number of seconds by two** and compare to the time in table 23. If manifold pressure is correct and rate is incorrect, check gas orifices for proper size and restriction.
- 3- Remove temporary gas meter if installed.

NOTE- To obtain accurate reading, shut off all other gas appliances connected to meter.

TABLE 23

GAS METER CLOCKING CHART				
Unit Input Rate (Btuh)	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
70,000	51	103	129	257
108,000	33	67	83	167
150,000	24	48	60	120
130,000	28	55	69	138
180,000	20	40	50	100
240,000	15	30	38	75
260,000	14	28	35	69
360,000	10	20	25	50
480,000	8	15	19	38
Natural-1000 btu/cu ft			LP-2500 btu/cu ft	

Note: Table assumes standard temperature (60°F), pressure (30in.Hg.)and fuel heating values (Btuh/Ft.³). Apply pressure corrections in altitudes above 2000 ft.

MSAV™ Unit Start-Up

Units may contain a supply air blower equipped with a variable frequency drive A96 (VFD) which stages supply air CFM.

The supply air VFD (A96) is located near the compressors. See figure 34.

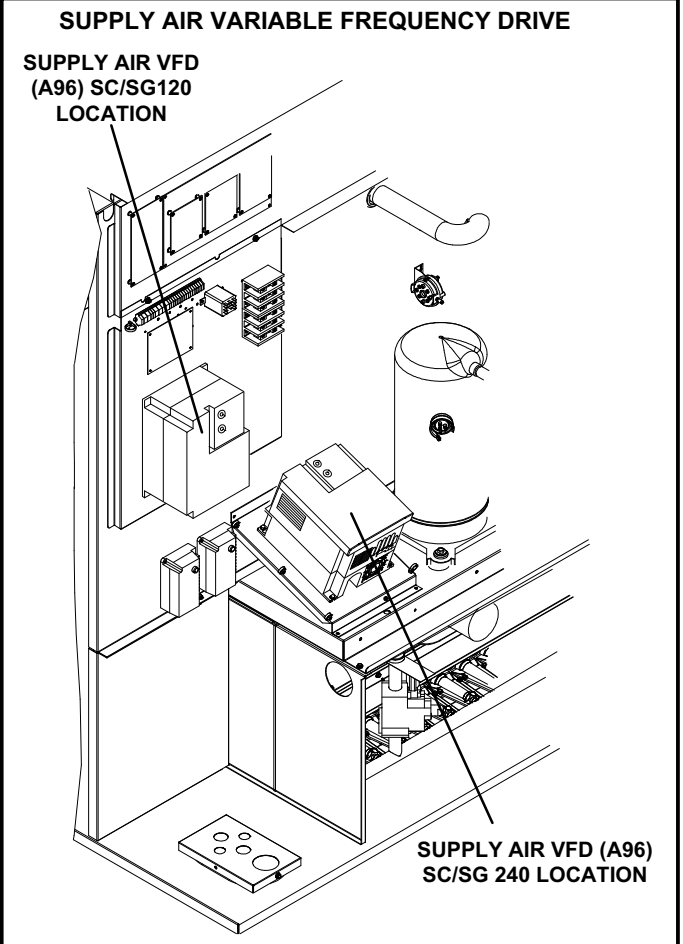


FIGURE 34

A-Design Specifications

Use table 24 to fill in field-provided, design specified blower CFM for appropriate unit.

If only high and low cooling design specifications are provided, set the medium cooling CFM at the high or low cooling design spec or any CFM between.

B-Set Maximum CFM

Use table 24 to determine highest blower CFM for appropriate unit. Adjust the blower pulley to deliver that amount of CFM with only the blower operating. See *Determining Unit CFM* in the Blower Operation and Adjustment section.

C-Enter Design Specifications Into Controller

- 1- Use the following menu to enter the blower design specified CFM into the Unit Controller. Make sure blower CFM is within limitations shown in table 25. Refer to the Unit Controller manual provided with unit.

SETUP>TEST & BALANCE>BLOWER> (enter information as prompted by the Unit Controller if not already done).

- 2- Enter the following design specifications as shown in table 30.

- Blower / Heat CFM
Cooling High CFM¹
Cooling Low CFM¹
Vent CFM

¹The Unit Controller will prompt when more cooling stages are available depending on the number of compressors and the control mode.

- 3- Adjust the blower RPM to deliver the target CFM based on the measured static pressure using the blower table.
- 4- Measure the static pressure again and apply the static pressure and RPM to the tables to determine adjusted CFM.
- 5- Repeat adjustments until design CFM is reached.

D-Set Damper Minimum Position

To maintain required minimum ventilation air volumes when the unit is in the occupied mode, two minimum damper positions must be set. The Unit Controller will open the dampers to “Min OCP Blwr Low” when blower CFM is BELOW a “midpoint” CFM. The Unit Controller will open the damper to “Min OCP Blwr High” when blower CFM is at or ABOVE the “midpoint” CFM.

The Unit Controller will calculate the “midpoint” CFM.

Set Minimum Position 1

Use the following menu in the Unit Controller to set “Min OCP Blwr Low” for the blower CFM below the “midpoint” CFM. When navigating into this menu, the Unit Controller will bring on the corresponding blower speed and allow damper position adjustment.

SETTINGS>RTU OPTIONS>DAMPER>
MIN DAMPER POSITION BLOWR ON HIGH = X.X%

TABLE 24
Blower CFM Design Specifications

Unit	T ^{Stat} or Zone Control Stages	Blower Speed	Design Specified CFM
120, 240	2	Htg.	
		Clg. High	
		Clg. Low	
		Ventilation	
240	4	Htg.	
		Clg. High	
		Clg. Med. High	
		Clg. Med. Low	
		Clg. Low	
		Ventilation	

*Available blower speeds vary by unit and thermostat stages.

Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the Unit Controller to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

Note - Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.

**TABLE 25
MINIMUM AND MAXIMUM CFM**

Gas Heat Minimum CFM		
Unit	Gas Heat Size	Airflow CFM
SG 120	Std. , Med.	2225
SG 120	High	2550
SG 240	Std. , Med.	4450
SG 240	High	5075
Electric Heat Minimum CFM		
Unit	Heat Size (kW)	Airflow CFM
SC 120	0, 15, 20, 30, 40, 45, 60	3800
SC 240	0, 20, 30, 40, 60, 80, 90	8000
Cooling Minimum CFM - 220 CFM/ton		
Unit	Blower Speed	Airflow CFM
SG/SC 120	Low, Med. Low, Med. High	2200
SG/SC 240	Low, Med. Low, Med. High	4400
Cooling Minimum CFM - 280 CFM/ton		
Unit	Blower Speed	Airflow CFM
SG/SC 120	High	2800
SG/SC 240	High	5600
Smoke and Ventilation Minimum CFM - 150 CFM/ton		
Unit	Not Applicable	Airflow CFM
SG/SC 120	NA	1500
SG/SC 240	NA	3000
Heating and Cooling Maximum CFM - 480 CFM/ton		
Unit	Blower Speed	Airflow CFM
SG/SC 120	High	4800
SG/SC 240	High	9600

Set Minimum Position 2

Use the same menu in the Unit Controller to set "Min OCP Blwr High" for the blower CFM above the "midpoint" CFM. When navigating into this menu, the Unit Controller will bring on the corresponding blower speed and allow damper position adjustment.

Settings / Control / MSAV / Damper / High Speed

Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the Unit Controller to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

Note - Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.

MSAV™ Operation

This is a summary of cooling operation. Refer to the sequence of operation provided in the Engineering Handbook or Service Manual for more detail.

A-Two-Stage T'Stat; 2- and 4-Compressor Units

1-Economizer With Outdoor Air Suitable

Y1 Demand -

Compressors Off
Blower Cooling Low
Dampers modulate

Y2 Demand -

Compressors Off
Blower Cooling High
Dampers Modulate

Note - If dampers are at maximum open for three minutes, compressor 1 and 2 are energized and blower stays on cooling high.

2-No Economizer or Outdoor Air Not Suitable

Y1 Demand -

First-stage Compressors On
(compressor 1 on 120 units,
compressor 1 & 2 on 240 units)
Blower Cooling Low
Dampers Minimum Position

Y2 Demand -

All Compressors On
Blower Cooling High
Dampers Minimum Position

B-Zone Sensor (4 Clg. Stages), 4-Compressor Units (240 Units)

1-Economizer With Outdoor Air Suitable

Y1 Demand -

Compressors Off
Blower Cooling Low
Dampers modulate

Y2 Demand -
Compressors Off
Blower Cooling High
Dampers Modulate

Note - If dampers are at maximum open for three minutes, compressor 1 is energized and blower stays on cooling high.

Y3 Demand -
Compressors 1 and 2 On
Blower Cooling High
Dampers Maximum Open

Y4 Demand -
All Compressors On
Blower Cooling High
Dampers Maximum Open

2-No Economizer or Outdoor Air Not Suitable

Y1 Demand -
Compressor 1 On
Blower Cooling Low

Y2 Demand -
Compressors 1 and 2 On
Blower Cooling Medium Low

Y3 Demand -
Compressors 1, 2 and 3 On
Blower Cooling Medium High

Y4 Demand -
All Compressors On
Blower Cooling High

Direct Drive Blower Start-Up

A-Set Blower Speed

1- Use table 26 to fill in field-provided, design specified blower CFM.

TABLE 26
Blower CFM Design Specifications

Blower Speed	Design Specified CFM
Heating	
Cooling High	
Cooling Low	
Ventilation	

2- Use the following menu to enter the blower design specified CFM into the Unit Controller. **Don't press "SAVE" until all CFM are entered.** Make sure blower CFM is within limitations shown in table 27. Refer to the Unit Controller manual provided with unit.

SETUP > TEST & BALANCE > BLOWER

3- Once all four speeds are entered, the target (highest of the heating and cooling settings) CFM and default RPM will be displayed.

Note - When units are not equipped with heat, the Blower Heat speed will not be displayed. Blower Cooling High will be the first blower speed to appear.

4- Measure the static pressure as shown in the Blower Start-Up section. Use the static pressure, target CFM and blower tables to determine the RPM needed. Values in the blower table reflect the static pressures taken in locations shown in figure 24.

5- Enter the RPM and repeat the previous step until the design CFM is reached.

6- Press SAVE followed by MAIN MENU.

Note - Once the CFM settings are saved, the Unit Controller will set all other blower CFM.

B-Set Damper Minimum Position

To maintain required minimum ventilation air volumes when the unit is in the occupied mode, two minimum damper positions must be set. The Unit Controller will open the dampers to "Min OCP Blwr Low" when blower CFM is BELOW a "midpoint" CFM. The Unit Controller will open the damper to "Min OCP Blwr High" when blower CFM is at or ABOVE the "midpoint" CFM.

The Unit Controller will calculate the “midpoint” CFM.

Set Minimum Position 1

Use the following menu in the Unit Controller to set “Min OCP Blwr Low” for the blower CFM below the “midpoint” CFM. When navigating into this menu, the Unit Controller will bring on the corresponding blower speed and allow damper position adjustment.

SETTINGS > RTU Options > EDIT PARAMETER > ENTER DATA ID - 9 > MIN DAMPER LOW BLOWER = X.X %

Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the Unit Controller to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

Note - Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.

Set Minimum Position 2

Use the same menu in the Unit Controller to set “Min OCP Blwr High” for the blower CFM above the “midpoint” CFM. When navigating into this menu, the Unit Controller will bring on the corresponding blower speed and allow damper position adjustment.

SETTINGS > RTU OPTIONS > DAMPER > MIN DAMPER POSITION BLOWER ON HIGH = X.X %

Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the Unit Controller to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

Note - Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.

**TABLE 27
MINIMUM AND MAXIMUM CFM
DIRECT DRIVE BLOWERS
036 & 060**

Gas Heat Minimum CFM		
Unit	Gas Heat Size	Airflow CFM*
SG 036, 060	Std.	1175
SG 036	Med.	1475
SG 060	Med.	1500
SG 060	High	1625
Electric Heat Minimum CFM		
Unit	Heat Size (kW)	Airflow CFM
SC 036	0, 10, 15	1025
SC 060	0, 10, 15, 20, 30	1650
Cooling Low Minimum - CFM		
Unit	Blower Speed	Airflow CFM
SG/SC 036	Low	600
SG/SC 060	Low	750
Cooling High Minimum - CFM		
Unit	Blower Speed	Airflow CFM
SG/SC 036	High	600
SG/SC 060	High	750
Smoke and Ventilation Minimum - CFM		
Unit	Blower Speed	Airflow CFM
SG/SC 036	High	600
SG/SC 060	High	750
Cooling Maximum CFM - 480 CFM/ton		
Unit	Blower Speed	Airflow CFM
SG/SC 036	High	1450
SG/SC 060	High	2400
Electric Heat Maximum CFM		
Unit	Blower Speed	Airflow CFM
SC 036	High	1450
SC 060	High	2400
Gas Heat Maximum CFM		
Unit	Gas Heat Size	Airflow CFM
SG 036	Std.	1450
SG 036	Med.	1475
SG 060	Std., Med., High	2400

*Rounded to nearest 25 CFM.

Hot Gas Reheat Start-Up And Operation

General

Hot gas reheat units provide a dehumidifying mode of operation. These units contain a reheat coil adjacent to and downstream of the evaporator coil. Reheat coil solenoid valve, L14 (and L30 on 240 units), routes hot discharge gas from the compressor to the reheat coil. Return air pulled across the evaporator coil is cooled and dehumidified; the reheat coil adds heat to supply air.

See figure 35 through 37 for reheat refrigerant routing.

L14/L30 Reheat Coil Solenoid Valve

When Unit Controller input (Unit Controller J298-5 or J299-8) indicates room conditions require dehumidification, L14/L30 reheat valve is energized (Unit Controller P269-3 or P269-4) and refrigerant is routed to the reheat coil.

Reheat Setpoint

Reheat is factory-set to energize when indoor relative humidity rises above 60% (default). The reheat setpoint can be adjusted by changing Unit Controller Settings - Control menu. A setting of 100% will operate reheat from an energy management system digital output.

Reheat will terminate when the indoor relative humidity falls 3% (57% default) or the digital output de-energizes. The reheat deadband can be adjusted at Settings - Control menu.

A91 Humidity Sensor (120 & 240 Units)

Relative humidity should correspond to the sensor (A91) output voltage listed in table 28. For example: if indoor air relative humidity is $80\% \pm 3\%$, the humidity sensor output should read 8.00VDC.

Check the sensor output annually for accuracy. Keep the air intake openings on the sensor clean and free of obstructions and debris.

TABLE 28

Relative Humidity (%RH \pm 3%)	Sensor Output (VDC)
20	2.00
30	3.00
40	4.00
50	5.00
60	6.00
70	7.00
80	8.00
90	9.00

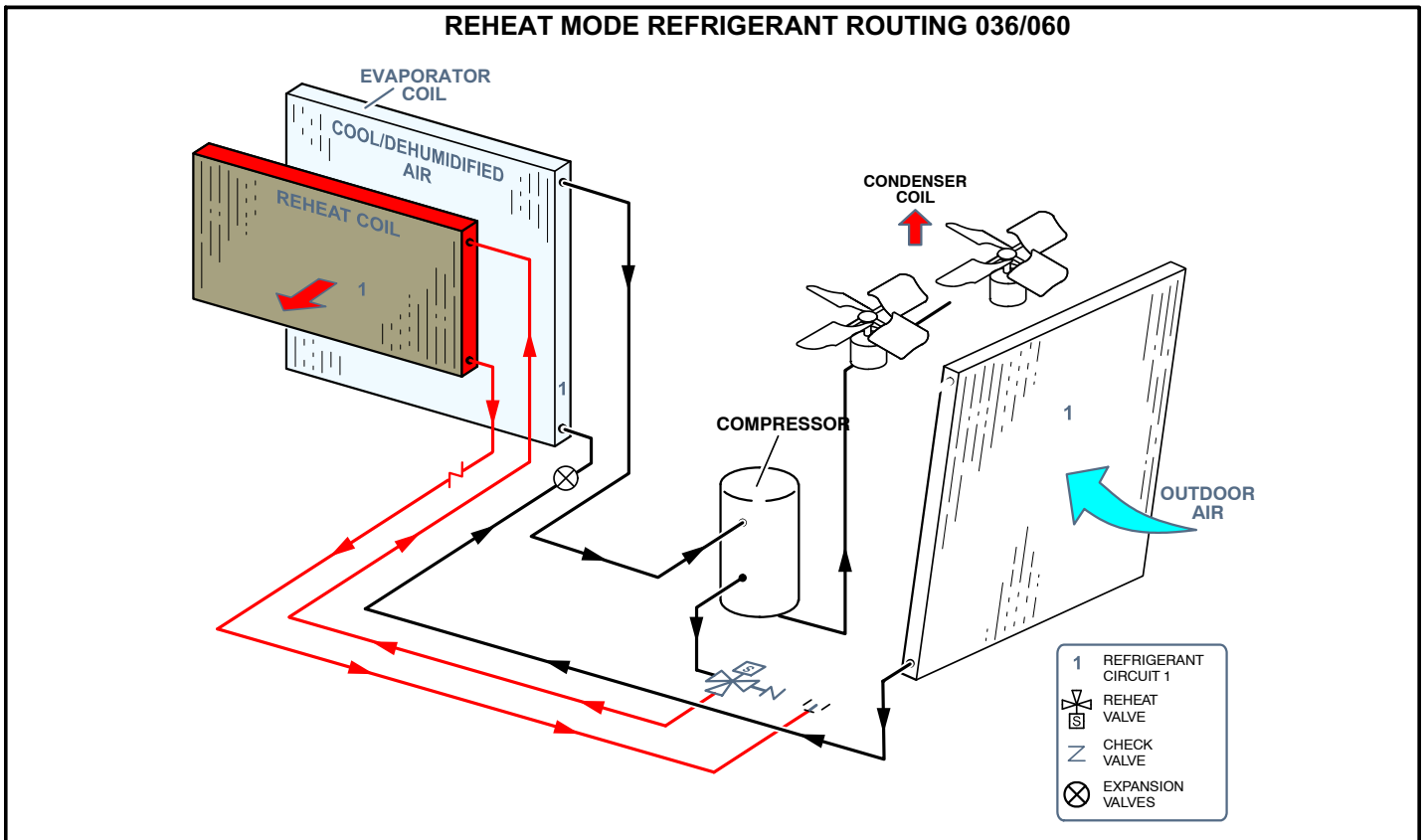


FIGURE 35

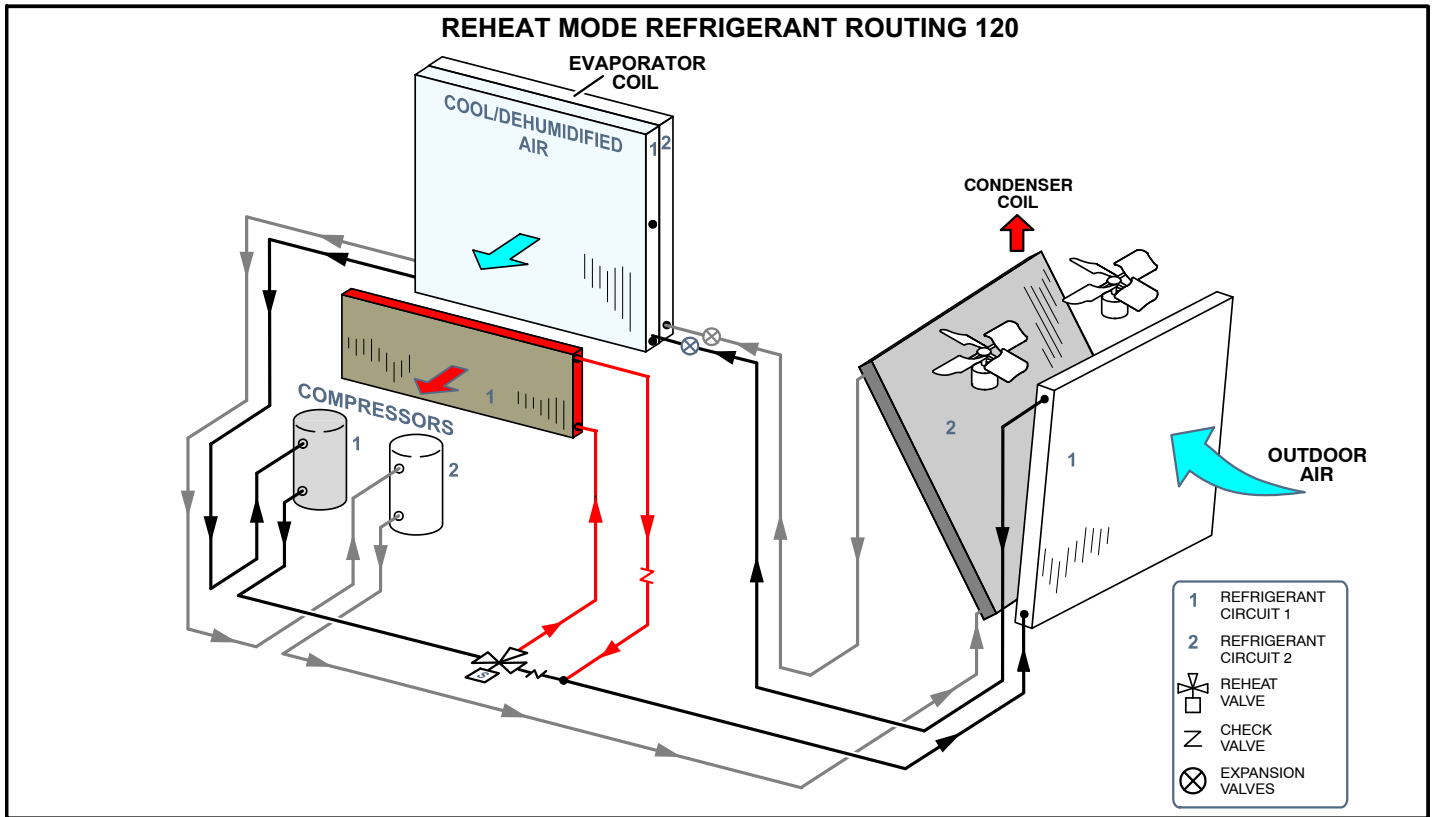


FIGURE 36

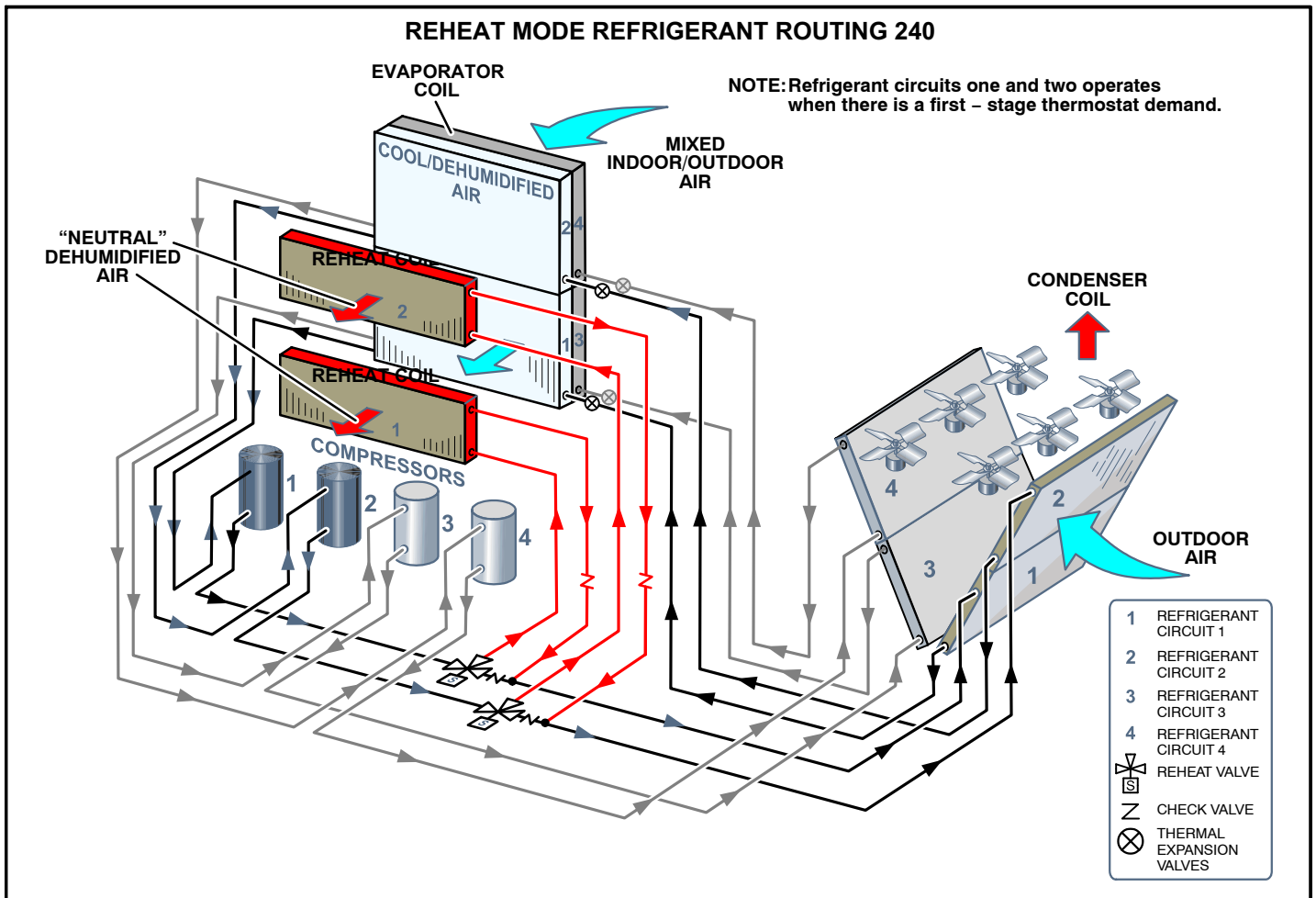


FIGURE 37

Check-Out

Test reheat operation using the following procedure.

- 1- Make sure reheat is wired as shown in wiring section.
- 2- Make sure unit is in local thermostat mode.
- 3- Use Unit Controller key pad to elect SERVICE > TEST > DEHUMIDIFIER.

036, 060, 120 -

The blower and compressor (reheat) should be operating. DEHUMIDIFIER 1 ON will be appear on the Unit Controller display.

240 -

The blower, compressor 1, and compressor 2 (reheat) should be operating. L14 and L30 LEDs on the Unit Controller should also be ON, indicating the reheat valves are energized. REHEAT MODE will be appear on the Unit Controller display.

- 4- Press BACK on the Unit Controller display to stop the testing mode.

Default Reheat Operation - 036 & 060

During reheat mode free cooling is locked out.

No Y1 demand but a call for dehumidification:

Compressor is operating, blower is on, and the reheat valve is energized.

Y1 demand:

Compressor is operating, blower is on, and the reheat valve is energized.

Y2 demand:

Compressor is operating, blower is on, and the reheat valve is de-energized.

Default Reheat Operation - 120

TABLE 29

Reheat Operation - Two Cooling Stages - Default

T'stat and Humidity Demands	Operation
Reheat Only	Compressor 1 Reheat & Blower Low Speed
Reheat & Y1	Compressor 1 Reheat & Compressor 2 Cooling* & Blower High Speed
Reheat & Y1 & Y2	Compressor 1 Cooling & Compressor 2 Cooling** & Blower High Speed

*If there is no reheat demand and outdoor air is suitable, free cooling will operate.

**If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 will operate.

Default Reheat Operation - 240

Reheat will operate as shown in table 30 once three conditions are met:

- 1- Blower must be operating.
- 2- System must be in occupied mode.
- 3- System must NOT be operating in heating mode.

IMPORTANT - Free cooling does not operate during reheat.

For other reheat control options, refer to the Unit Controller manual.

Additional Cooling Stages

Units are shipped from the factory to provide two stages of cooling.

Three stages of cooling is available in zone sensor mode. Three stages of cooling is also available by installing a transfer relay and a three-stage thermostat. Refer to the Main Control Operation section in the Unit Controller manual when using the transfer relay.

Additional Cooling Stages - 240

Four stages of cooling is available in zone sensor mode on units with four compressors.

Compressors are not de-energized when unit operation changes from cooling to reheat or from reheat to cooling. Instead, L14 and L30 reheat valves are energized (reheat) or de-energized (cooling).

NOTE - Another thermostat staging option is available which allows both compressors to be energized during free cooling. See Unit Controller manual for details.

**TABLE 30
REHEAT OPERATION**

Two-Stage Thermostat - Default	
T'stat and Humidity Demands	Operation
	240 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 & 4 Cooling ¹
Reheat & Y1 & Y2	Compressor 1, 2, 3 & 4 Cooling ³
Three-Stage Thermostat (Transfer relay required)	
T'stat and Humidity Demands	Operation
	240 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling ¹
Reheat Y1 & Y2	Compressor 1 & 2 Reheat and Compressor 3, & 4 Cooling ³
Reheat Y1 & Y2 & Y3	Compressor 1, 2, 3, & 4 Cooling ⁴
Four-Stage Zone Sensor Mode	
Cooling* and Humidity** Demands	Operation
	240 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling ¹
Reheat & Y1 & Y2	Compressor 1 & 2 Reheat and Compressor 3 & 4 Cooling ²
Reheat & Y1 & Y2 & Y3	Compressor 1 Reheat, Compressor 2, 3, & 4 Cooling ³
Reheat & Y1 & Y2 & Y3 & Y4	Compressor 1, 2, 3, & 4 Cooling ⁵

*Cooling stage is initiated when zone temperature is higher than the cooling setpoint plus the appropriate stage differential.

**Reheat demand is initiated when relative humidity is higher than relative humidity setpoint.

¹If there is no reheat demand and outdoor air is suitable, free cooling will operate.

²If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 will operate.

³If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 and 2 will operate.

⁴If there is no reheat demand and outdoor air is suitable, free cooling, compressor 1, 2 and 3 will operate.

⁵If there is no reheat demand and outdoor air is suitable, free cooling, compressor 1, 2, 3 and 4 will operate.

The following conditions must be met before reheat will be energized:
(factory-default; see Unit Controller manual for other options)

1- Blower must be operating.

3- System must NOT be operating in heating mode.

2- System must be in occupied mode.

Optional Economizer Settings

A-General

The economizer allows outdoor air to be used for free cooling or ventilation requirements.

B-Configure Economizer

Use the following menu and go through the installation wizard.

SETUP > INSTALL

When prompted, set **Configuration ID 1**, position **2** to the applicable economizer option. Economizer options are shown in table 31. Once the option is set, the installation wizard prompts will vary depending on the option selected.

Note - Some setup information is factory-set, such as the unit model number. Verify that each setting is correct before advancing to the next prompt.

Sensors are used to determine outdoor air suitability for free cooling. Some economizer options require field-installed sensors. See table 31. See figure 38 for sensor locations.

Use the following menu to make adjustments to the economizer option once configured. Refer to the Menu Interface tables in the Unit Controller Setup Guide provided with this unit.

SETUP > TEST & BALANCE > DAMPER

**TABLE 31
ECONOMIZER CONFIGURATION OPTIONS**

Option	Description	Required Sensors	Dampers will modulate to 55°F* (default) discharge air when outdoor air is suitable:	Parameter**
M	Motorized Outdoor Air Dampers	None	Dampers do not modulate; dampers will open to minimum position during the occupied time period and close during the unoccupied time period.	NA
T	ECON FRCL TEMP OFFSET	Factory-Installed	Outdoor air temperature (RT17) is less than return air temperature (RT16) by at least the OFFSET value (10°F default).	161
	ECON FREECL TEMP SP	Factory-Installed	Outdoor air temperature (RT17) is less than the free cooling setpoint (60°F default).	160
G	GLO	NA	Dampers will modulate to maintain 55°F* (default) discharge air when a 24VAC signal is provided to the GLO input (P297-9). Global input also brings on the blower. Refer to Energy Management System manufacturer's instructions for required sensors.	NA
S	ECON FREECL ENTH SP	C7400	Outdoor air enthalpy (A7) is less than free cooling setpoint (73°F default).	162
D	ECN FRCL ENTH OFFSET	(Two) C7400	Outdoor air enthalpy (A7) is less than return air enthalpy (A62) by at least the OFFSET value.	163

*RT6 discharge air sensor is factory-installed. See parameter 159 in the Unit Controller Setup Guide.

**Refer to the Menu Interface tables in the Unit Controller Setup Guide provided with this unit.

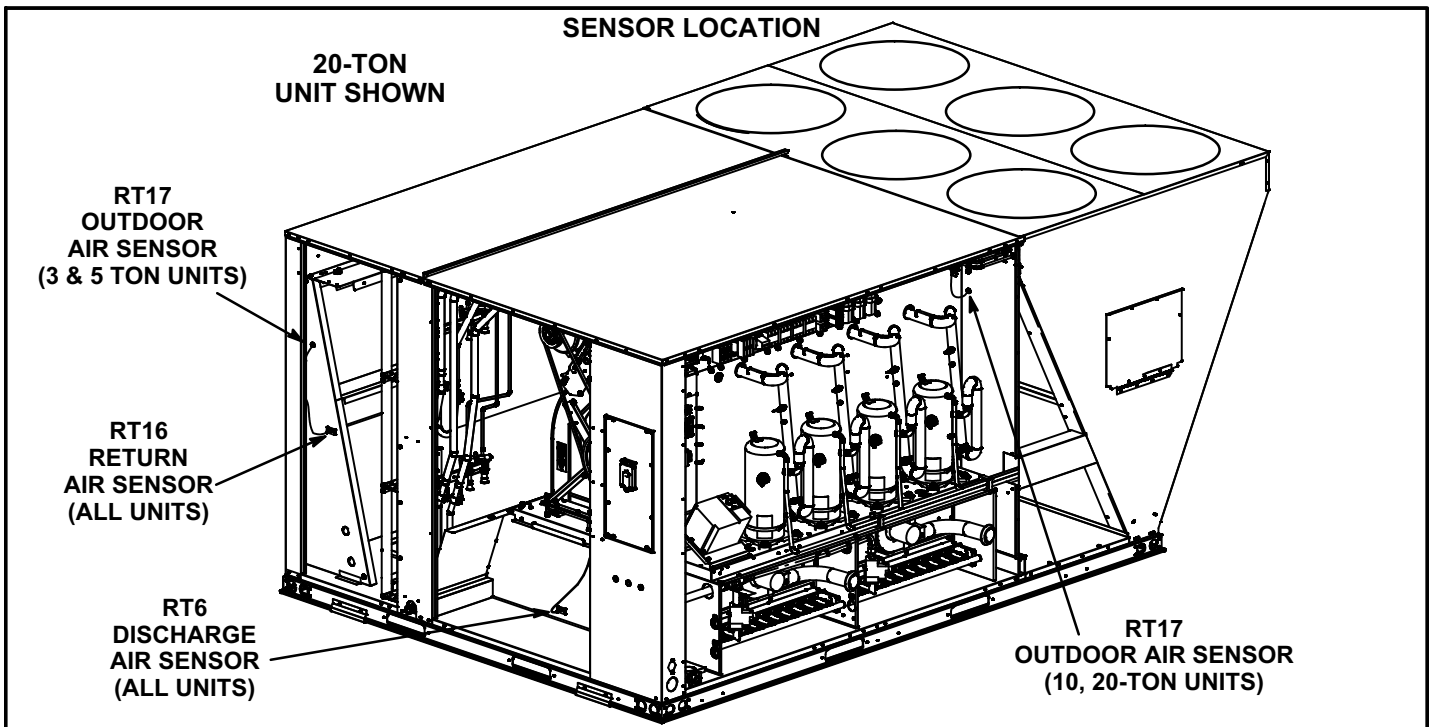


FIGURE 38

C-Economizer Operation

Note - Use indicating lights on Unit Controller to determine thermostat demand.

See table 32 for economizer operation with a standard two-stage thermostat

D-Damper Minimum Position Setting

Use the following menu path to modify the minimum damper positions for both high and low operations.

SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION BLOWER ON HIGH = .%

SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION BLOWER ON LOW = .%

Table 33 shows economizer operation with an energy management system which uses a global sensor.

Both tables show the occupied and unoccupied time period. The occupied time period is determined by the thermostat or energy management system.

Table 34 shows economizer operation in zone sensor mode.

E-IAQ Damper Operation

The Unit Controller has a 0-10VDC IAQ input for a standard 0-2000ppm CO₂ sensor. The economizer starts opening at a CO₂ level of 700 ppm (default) and reaches full open at a CO₂ level of 1200ppm. Adjustments may be made to the indoor air quality parameters to alter operation or meet required specifications (parameters 117 through 119). Go to **SETUP > TEST & BALANCE > DAMPER > VENTILATION OPTIONS.**

If the economizer is operating in the free cooling mode and the IAQ sensor demands more fresh air, the IAQ demand will override the free cooling demand to open the dampers further or to keep them open.

The IAQ function is not energized during the unoccupied or night time period.

**TABLE 32
ECONOMIZER OPERATION - Standard Two-Stage Thermostat (Default Option)**

THERMOSTAT DEMAND	DAMPER POSITION UNOCC.	DAMPER POSITION OCCUPIED	MECHANICAL COOLING
OUTDOOR AIR IS NOT SUITABLE FOR FREE COOLING			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	CLOSED	MINIMUM	STAGE 1
Y2	CLOSED	MINIMUM	STAGES 1 AND 2
OUTDOOR AIR IS SUITABLE FOR FREE COOLING			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	MODULATING	MODULATING	NO
Y2	MODULATING	MODULATING (1)	STAGE 1

Note - Modulating dampers adjust to control supply air (RT6) to 55°F (13°C). (1) The Unit Controller goes into a “cool down” or “warm-up” mode when the occupied time period starts. (2) Units with two-stage compressor operation will operate only stage 1 with a Y2 demand.

**TABLE 33
ECONOMIZER OPERATION WITH GLOBAL SENSING - Energy Management System (Default Option)**

THERMOSTAT DEMAND	DAMPER POSITION UNOCC.	DAMPER POSITION OCCUPIED	MECHANICAL COOLING
GLOBAL INPUT OFF			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	CLOSED	MINIMUM	STAGE 1
Y2	CLOSED	MINIMUM	STAGES 1 AND 2
GLOBAL INPUT ON			
OFF	MODULATING	MODULATING	NO
G	MODULATING	MODULATING	NO
Y1	MODULATING	MODULATING	STAGE 1
Y2	MODULATING	MODULATING (1)	STAGES 1 AND 2 (2)

Note - Modulating dampers adjust to control supply air (RT6) to 55°F (13°C). (1) The Unit Controller goes into a “cool down” or “warm-up” mode when the occupied time period starts. (2) Units with two-stage compressor operation will operate only stage 1 with a Y2 demand (default).

**TABLE 34
ECONOMIZER OPERATION - Zone Sensor Mode**

DEMAND	DAMPER POSITION UNOCC.	DAMPER POSITION OCCUPIED	MECHANICAL COOLING
OUTDOOR AIR IS NOT SUITABLE FOR FREE COOLING			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Cooling Stage 1	CLOSED	MINIMUM	COMPRESSOR 1
Cooling Stage 2	CLOSED	MINIMUM	COMPRESSOR 1 & 2
Cooling Stage 3	CLOSED	MINIMUM	COMPRESSOR 1, 2, & 3
Cooling Stage 4	CLOSED	MINIMUM	COMPRESSOR 1, 2, 3, & 4
OUTDOOR AIR IS SUITABLE FOR FREE COOLING			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Cooling Stage 1	MODULATING	MODULATING	NO
Cooling Stage 2	FULL OPEN*	FULL OPEN*	COMPRESSOR 1
Cooling Stage 3	FULL OPEN*	FULL OPEN*	COMPRESSORS 1 & 2
Cooling Stage 4	FULL OPEN*	FULL OPEN*	COMPRESSORS 1, 2, 3, & 4

*Damper will modulate to maintain 55°F supply air when parameter 164 is changed to setting "0". Note - Modulating dampers adjust to control supply air (RT6) to 55°F (13°C).

Service

To maintain efficiency and longevity, your equipment must be serviced yearly by a qualified service technician. Failure to provide proof of service can void warranty.

A-Lubrication

All motor bearings are prelubricated. No further lubrication is required.

B-Filters

Units are equipped with filters as shown in table 35. Units will accept 4" filters. Filters should be checked monthly and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters.

NOTE-Filters must be U.L.C. certified or equivalent for use in Canada.

**TABLE 35
Number and Size of Filter By Unit**


SG/SC Unit	Qty	Filter Size - inches (mm)
036, 060	4	16 X 20 X 2 (406 X 508 X 51)
120	4	20 X 25 X 2 (508 X 635 X 51)
240	12	20 X 20 X 2 (508 X 508 X 51)

⚠ WARNING



Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠ WARNING



Electric shock hazard and danger of explosion. Can cause injury, death or product or property damage. Turn off gas and electrical power to unit before performing any maintenance or servicing operations on the unit. Follow lighting instructions attached to unit when putting unit back into operation and after service or maintenance.

C-Burners (SG Units)

Periodically examine burner flames for proper appearance during the heating season. Before each heating season examine the burners for any deposits or blockage which may have occurred.

- 1- Turn off both electrical power and gas supply to unit.
- 2- Open burner compartment access panel.
- 3- Remove and retain screws securing burner box top cap.
- 4- Remove and retain two screws securing burners to burner support and lift the individual burners or the entire burner assembly from the orifices. See figure 39 for 036 & 060 units and figure 40 for 120, 240 units. Clean burners as necessary.
- 5- Locate the ignitor under the right burner for 036 and 060 units. See figure 41. Locate the ignitor under the left burner for 120 and 240 units. See figure 43 and table 36. Use appropriately sized twist drills or feeler gauges to check the spark gap as shown in figure 42.
- 6- Replace burners and secure with retained screws.
- 7- Replace access panel.

8- Restore electrical power and gas supply. Follow lighting instructions attached to unit and use inspection port in access panel to check flame.

⚠ WARNING

Danger of explosion.
Can cause injury or death.
Do not overtighten main burner mounting screws. Snug tighten only.

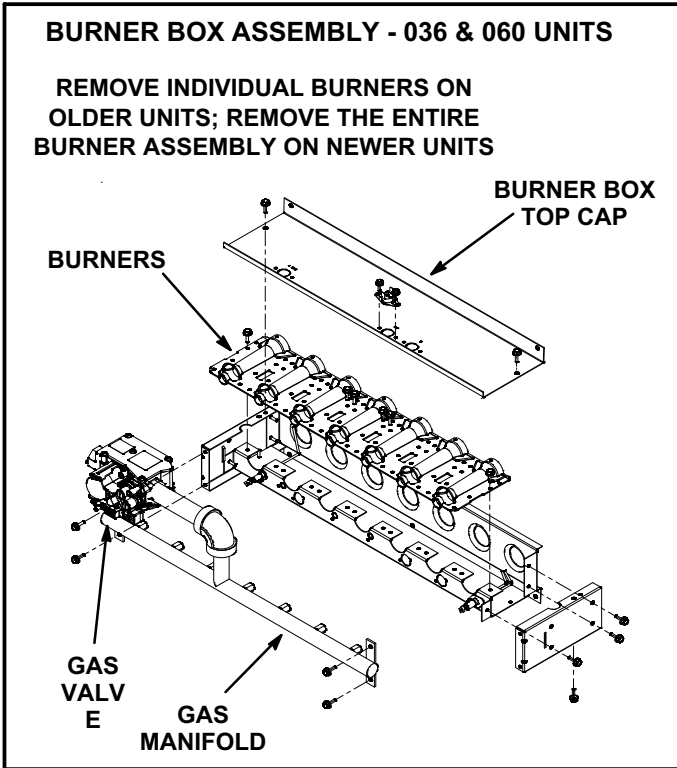


FIGURE 39

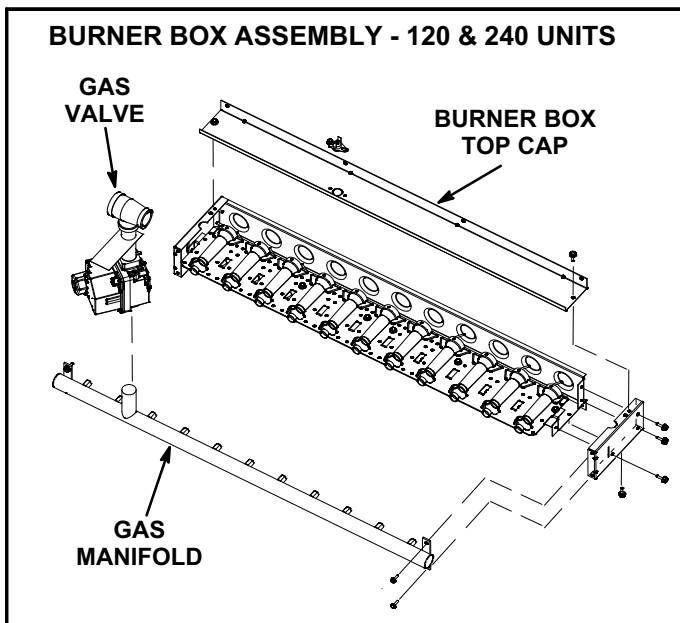


FIGURE 40

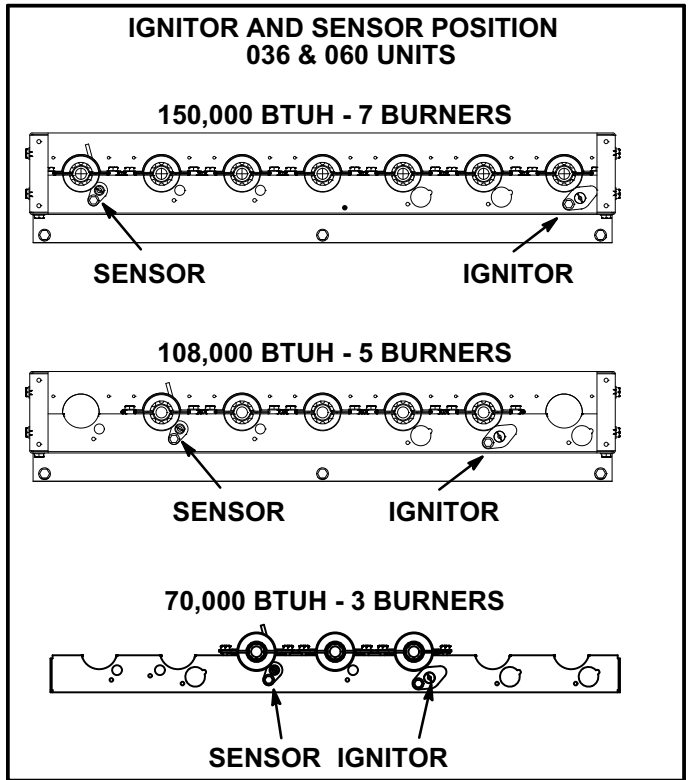


FIGURE 41

D-Combustion Air Inducer (SG Units)

A combustion air proving switch checks combustion air inducer operation before allowing power to the gas controller. Gas controller will not operate if inducer is obstructed.

Under normal operating conditions, the combustion air blower wheel should be checked and cleaned prior to the heating season. However, it should be examined periodically during the heating season to establish an ideal cleaning schedule. With power supply disconnected, the condition of the blower wheel can be determined by looking through the vent opening.

TABLE 36

Dimension	Unit Btuh Input	Length - in. (mm)	
		Ignitor	Sensor
A	130/260K	7-3/4 (197)	11 (279)
B	180/360K	5 (127)	5-1/2 (140)
C	240/480K	2-1/4 (57)	2-3/4 (70)

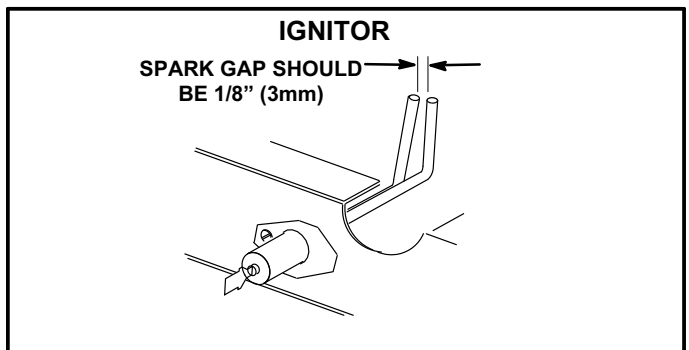


FIGURE 42

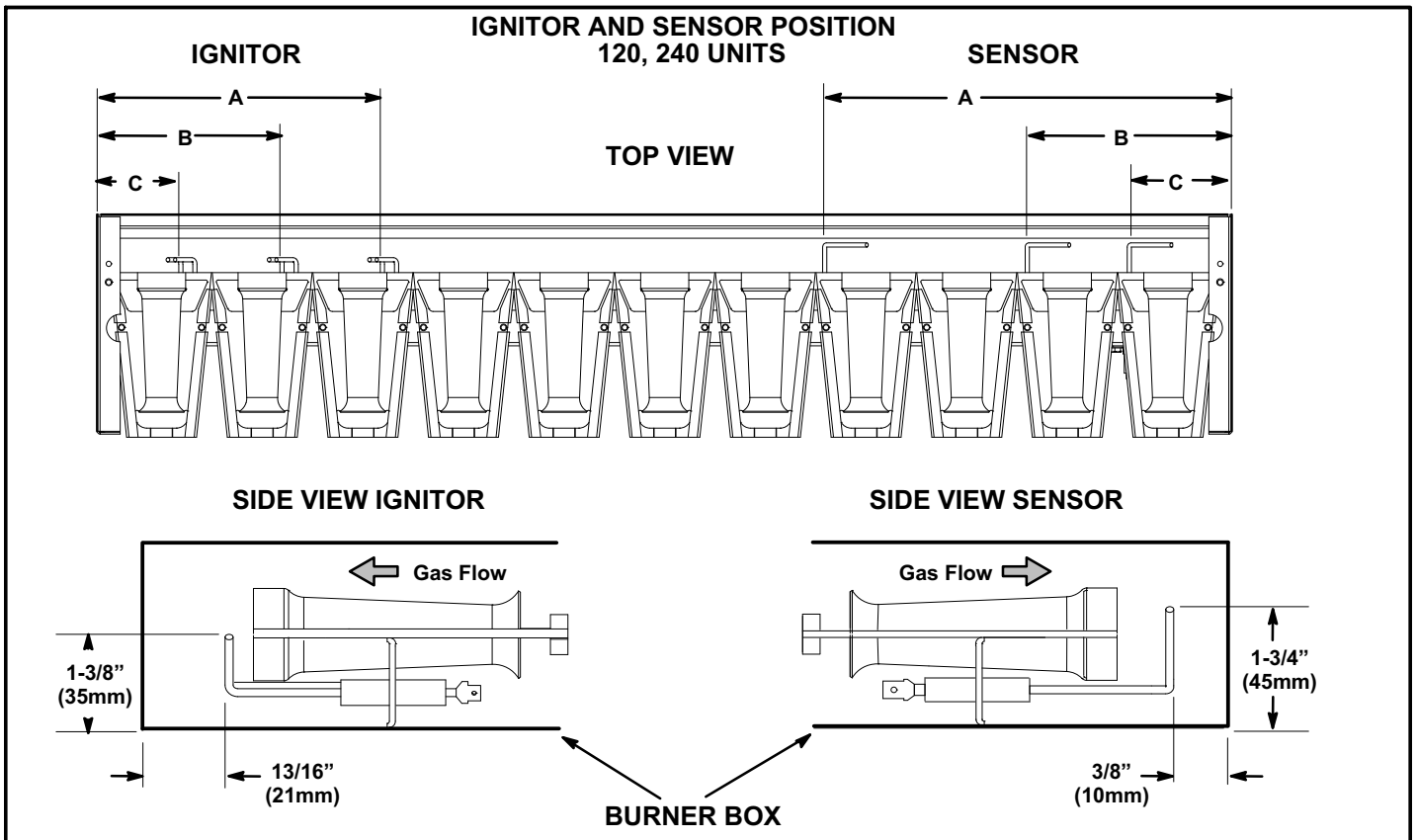


FIGURE 43

Cleaning Combustion Air Inducer

- 1- Shut off power supply and gas to unit.
- 2- Disconnect pressure switch air tubing from combustion air inducer port.
- 3- Remove and retain screws securing combustion air inducer to flue box. Remove vent connector. See figure 32 for 036 and 060 units and figure 44 for 120, and 240 units.
- 4- Clean blower wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.
- 5- Return combustion air blower motor and vent connector to original location and secure with retained screws. It is recommended that the combustion air inducer gasket be replaced during reassembly.
- 6- Clean combustion air inlet louvers on heat access panel using a small brush.

- 3- Clean tubes with a wire brush.

- 4- Reassemble the unit. The flue box cover gasket and combustion air inducer gasket should also be replaced during reassembly.

E-Flue Passageway and Flue Box (SG Units)

- 1- Remove combustion air inducer assembly as described in section D.
- 2- Remove flue box cover. Clean with a wire brush as required.

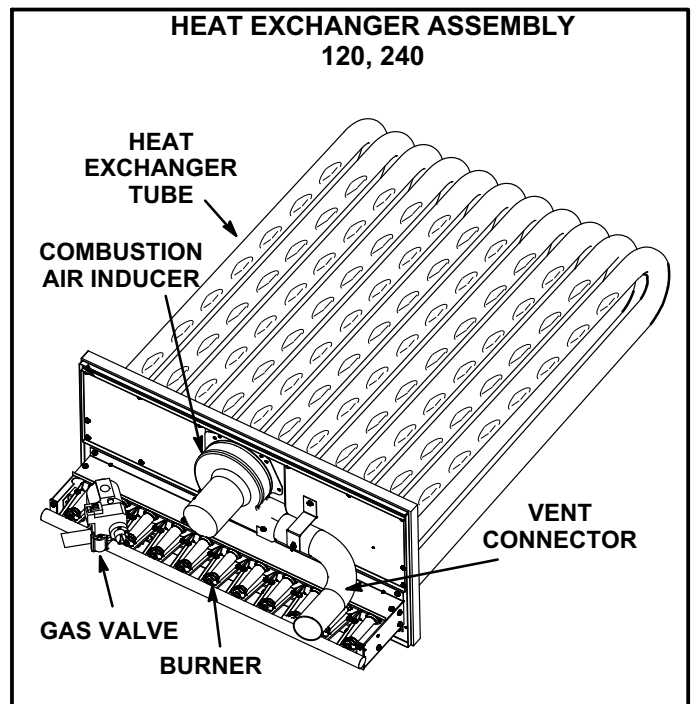


FIGURE 44

F-Evaporator Coil

Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleanser. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

G-Condenser Coil

Clean condenser coil annually with mild detergent or commercial coil cleaner and inspect monthly during the cooling season.

H-Supply Air Blower Wheel

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before removing access panel or cleaning blower wheel.

Factory Unit Controller Settings

Use the Unit Controller to adjust parameter settings. See the following tables for the appropriate menu path. Refer to the Unit Controller manual provided with each unit.

Tables 37 through 42 show factory settings (in degrees, % of fan CFM, etc.). Record adjusted settings on the parameter label located inside the compressor access panel.

TABLE 37
580902-01

45°F Compressor Lockout W/Economizer or Motorized OAD Settings			
SETTINGS > RTU OPTIONS > EDIT PARAMETERS			
Parameter	Factory Setting	Field Setting	Description
85	45		Low ambient lockout for compr 1.
86	45		Low ambient lockout for compr 2.
87	45		Low ambient lockout for compr 3.
88	45		Low ambient lockout for compr 4.
118	400		Sets damper to start opening at 2VDC on CO2 input.

TABLE 38
580730-01

Units With BACnet Module Settings
Use menu SETUP > NETWORK INTEGRATION . Set "BACNET" and network address.
BACNET MAC ADDRESS:

TABLE 39
580743-01

Units With LonTalk Settings
Use menu SETUP > NETWORK INTEGRATION . Set "LONTALK".

TABLE 40
580732-01

Units With Room Sensor, CPC/LSE Gateway Settings
Use menu SETUP > NETWORK INTEGRATION . Set "L CONNECTION" and network address.
LCONN ADDRESS:

**TABLE 41
580903-01**

SG/SC 120 Staged Blower			
Parameter	Factory Setting	Field Setting	Description
Note: Any changes to Smoke CFM setting must be adjusted before the other CFM settings. Use SETTINGS > RTU OPTIONS > EDIT PARAMETERS			
12	4000 CFM	CFM	Blower CFM during smoke detection.
SETUP > TEST & BALANCE (can also use SETTINGS > RTU OPTIONS > BLOWER > SPEEDS)			
	4000 CFM	CFM	Blower CFM during heating.
	3600 CFM	CFM	Blower CFM during high speed cooling (2 compressor) operation.
	2600 CFM	CFM	Blower CFM during low speed cooling (1 compressor) operation.
	4000 CFM	CFM	Blower CFM during ventilation.
*Once all four blower settings are entered, the target (highest of the heating and cooling settings) CFM will be displayed. Once the RPM is saved for the target CFM, all other blower RPM values are set by the Unit Controller according to the field CFM setting.			
SETUP > TEST & BALANCE (can also use SETTINGS > RTU OPTIONS > DAMPER)			
	0%	%	Damper min. position during LOW blower operation.
	0%	%	Damper min. position during HIGH blower operation.
	50%	%	Min. damper % for stage 1 power exhaust operation.
SETTINGS > RTU OPTIONS > EDIT PARAMETERS			
29	101%	%Open	Damper minimum position during G blower operation. (Setting parameter 29 to "101" disables parameter 29 and passes control to parameter 9 or 132)
216	5%	%	Deadband % for stage 1 power exhaust operation.

**TABLE 42
580904-01**

SG/SC 240 Staged Blower			
Parameter	Factory Setting	Field Setting	Description
	240		
Note: Any changes to Smoke CFM setting must be adjusted before the other CFM settings. Use SETTINGS > RTU OPTIONS > EDIT PARAMETER			
12	8000 CFM	CFM	Blower CFM during smoke detection.
SETUP > TEST & BALANCE (can also use SETTINGS > RTU OPTIONS > BLOWER > SPEEDS)			
	8000 CFM	CFM	Blower CFM during heating.
	7200 CFM	CFM	Blower CFM during compressor 4 operation.
	5200 CFM	CFM	Blower CFM during compressor 3 operation. This parameter is inactive for thermostats with 2-stage cooling.
	5200 CFM	CFM	Blower CFM during compressor 2 operation.
	5200 CFM	CFM	Blower CFM during compressor 1 operation. This parameter is inactive for thermostats with 2-stage or 3-stage cooling.
	8000 CFM	CFM	Blower CFM during ventilation.
SETUP > TEST & BALANCE (can also use SETTINGS > RTU OPTIONS > DAMPER)			
	0%	%	Damper min. position during LOW blower occupied operation.
	0%	%	Damper min. position during HIGH blower operation.
	50%	%	Min. damper % for stage 1 power exhaust operation.
SETTINGS > RTU OPTIONS > EDIT PARAMETERS			
29	101%	%	Damper minimum position during G blower operation. (Setting parameter 29 to "101" disables parameter 29 and passes control to parameter 9 or 132)
219	70%	%	Min. damper % for stage 2 power exhaust operation.
216	10%	%	Deadband % for stage 1 power exhaust operation.
220	10%	%	Deadband % for stage 2 power exhaust operation.
224	100	Sec	Stage 1 power exhaust off-delay in seconds.
30	70%	% Speed	Min. blower speed % for stage 2 power exhaust operation.

START-UP REPORT

Job Name: _____
 Store No. _____ Start-Up Date: _____
 Address: _____
 City: _____ State: _____
 Start-Up Contractor: _____
 Technician: _____
 Model No.: _____
 Serial No.: _____
 RTU No.: _____ Catalog No.: _____

Inspections and Checks			
Damage?	Yes	No	R22 <input type="checkbox"/> R410A <input type="checkbox"/>
If yes, reported to: _____			
Verify factory and field-installed accessories.			
Check electrical connections. Tighten if necessary.			
Supply voltage: L1-L2 _____ L1-L3 _____ L2-L3 _____			
If unit contains a 208-230/240 volt transformer:			
Check primary transformer tap <input type="checkbox"/>			
Transformer secondary voltage: _____			

Cooling Checks												
Compressor Rotation <input type="checkbox"/> Ambient Temp. _____ Return Air Temp. _____ Supply Air Temp. _____												
	Compressor Amps			Compressor Volts			Pressures		Condenser Fan Amps			CC Heater Amps
	L1	L2	L3	L1-L2	L1-L3	L2-L3	Disch.	Suct.	L1	L2	L3	L1
1												
2												
3												
4												

Blower Checks			
Pulley/Belt Alignment	<input type="checkbox"/>	Blower Rotation	<input type="checkbox"/>
Set Screws Tight	<input type="checkbox"/>	Belt Tension	<input type="checkbox"/>
Nameplate Amps: _____		Volts: _____	
Motor	Amps	Volts	
	L1 _____	L1-L2 _____	
	L2 _____	L1-L3 _____	
	L3 _____	L2-L3 _____	

Heating Checks - Electric							
Return Air Temp.: _____ Supply Air Temp.: _____							
Limits Operate: <input type="checkbox"/>							
	Amps						
	L1	L2	L3		L1	L2	L3
1				10			
2				11			
3				12			
4				13			
5				14			
6				15			
7				16			
8				17			
9				18			

Heating Checks - Gas		
Fuel type: Nat. <input type="checkbox"/> LP <input type="checkbox"/> Inlet Pressure: _____ in. w.c.		
Return Air Temp.: _____ Supply Air Temp.: _____		
Altitude: _____ Primary Limits Operate: <input type="checkbox"/>		
Gas Valve	Manifold Pressure	
	Low Fire	High Fire
GV1		
GV2		

Control Type

Accessory Checks	
Power Exhaust Amps	
1 _____	2 _____ None <input type="checkbox"/>
Economizer Operation	
Min. Pos. <input type="checkbox"/>	Motor travel full open/close <input type="checkbox"/>